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A tense moment.

Legislative Document (1925) No. 29

STATE OF NEW YORK

Conservation Commission

FOURTEENTH ANNUAL REPORT

For the Year 1924

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STATE OF NEW YORK

CONSERVATION COMMISSION

ALEXANDER MACDONALD	*Commissioner*
FRANCIS X. DISNEY	*Deputy Commissioner*
HERBERT F. PRESCOTT	*Secretary*

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FOURTEENTH ANNUAL REPORT

OF THE

CONSERVATION COMMISSION

To the Legislature:

Pursuant to statute, the Conservation Commission begs to submit, for the consideration of your honorable body, a report of its work for the past year, as well as certain recommendations which it trusts will meet with your approval.

In the text of this report the discussion of the work of the Commission has been carried down to the end of the calendar year, December 31, 1924. Financial and other tables which are directly related to the fiscal year are, however, carried only to the end of the fiscal year, June 30, 1924. This method of preparing the report has been adopted because of the fact that the Legislature each year must consider many questions of conservation which require knowledge of the Commission's doings down to date, and not merely information that is already six months old.

Under the statute, the work of the Commission is grouped under three divisions. This report considers each division in turn, preceding them, however, with a discussion of general topics. The arrangement is as follows:

I. General Topics.
II. Division of Fish and Game.
III. Division of Lands and Forests.
IV. Division of Saratoga Springs.
V. Conservation Bureau, Attorney-General's Office.
VI. Financial Statement of the Conservation Commission.

GENERAL TOPICS

For the fiscal year ending June 30, 1924, the receipts of the Conservation Commission amounted to $572,899.52 which was $76,542.95 more than for the preceding fiscal year and was the largest total ever collected by the Commission. Receipts from the sale of trees for reforesting purposes show an increase of 42.6 per cent over a year ago and an increase of 137 per cent over two years ago, breaking all records and indicating the rapid strides that the movement for planting forests on waste land is making throughout the State.

In all of its productive activities the Commission has had a very successful year. Its output of fish for stocking the waters of the State with both game and market fish which has shown an uninterrupted succession of increases for the past three years was further increased this year, the total exceeding one billion and nearly doubling the output of three years ago. The output of game bird eggs, which last year appeared to mark the capacity of the game bird farms, was again increased by about 8,000, but there was a falling off of approximately one-quarter of that number in the output of live birds.

Starting the Women's Federation Forest near Glens Falls. Mrs. E. C. Whitmyer, Chairman of Conservation for the State Federation, who is the author of the project is the fourth from the left standing.

The distribution of young trees for reforestation purposes from the Commission's three nurseries exceeded the output of any preceding year in the history of the Commission and the inventory of young trees on hand at the close of the fall planting season was the largest ever reported. When the rapid growth of the reforesting movement is considered, it is apparent that there must be a further increase in the capacity of these nurseries if the State is to keep pace with this movement.

During the fall, as the result of a condition of drought that is without precedent in the history of the weather bureau, there resulted an excessive fire hazard in the State forests which necessitated the closing of the fire towns in the Adirondacks and Catskills to hunting and camping. The Conservation Law provides that whenever, by reason of drought, the forests are in danger of fires which may be caused by hunters, fishermen, trappers or campers, the Governor shall have the power to determine that such pursuits are contrary to the public interest and to forbid, by proclamation, any person carrying on such pursuits in so much of the territory included within the fire towns as he deems the public interest requires. Such a proclamation was issued by the Governor on October 30th and was in force from October 31st to November 14th when the excessive fire hazard was reduced by rain and the proclamation was revoked. Following the proclamation there was a marked reduction in the number of forest fires in the fire towns, but a large number of fires occurred in the large forested areas outside of the Adirondack and Catskill Parks which could not be included in the proclamation. This was due in part to the fact that with the closing of the woods in the fire towns, more hunters went into the woods outside of the prohibited areas, and also to the fact that the season of excessive fire hazard came somewhat later in these areas which for the most part lie further south than the fire towns. Had the law permitted the closing of all the large

"Far from the madding crowd's ignoble strife."

Tongue Mountain Peninsula on Lake George is the latest addition to the State Parks. Tongue Mountain on the left, French Point Mountain on the right.

forested areas of the State to hunting and camping as was done in the fire towns, it would have resulted in preventing many extensive fires. The fire hazard is just as great in the forested areas lying outside of the fire towns as in the fire towns and these areas are nearly as great as in the fire towns. For the better protection of the forests, the provision which now limits the closing of the forests, by proclamation, to the fire towns should be amended so as to remove this limitation.

Studies of improved oyster cultural methods have been continued with success. This work is also being carried on by several other States, the Federal Government and some private persons. The object of all these studies is the rehabilitation of the oyster industry by assuring a continuous and sufficient supply of seed oysters, extending the areas available for oyster culture, assuring the sanitary quality of market shellfish and improving the breed. Giving all due credit to the work of others, the Commission is responsible for the following definite results:

First demonstration of artificial propagation under laboratory conditions;

Demonstration of possibility of rearing unlimited numbers of larvae up to the age of two to three weeks under commercial conditions and at low cost;

Demonstration of a practical method of collection of wild spat on artificial collectors;

Demonstration that thick set on artificial collectors can be reared to commercial seed size at a cost so low as to be of commercial promise;

Development of a certain and practicable method of oyster purification; which is now in successful commercial use.

We have solved the problem of oyster propagation in a hatchery, except for the interval covering the week or two just prior to actual setting on collectors. We have experience covering the greater part of this gap and should be able soon to close it. Whenever artificial propagation has been practically established, the oyster will have been domesticated and selective breeding will inevitably follow.

Work on the special investigation of stream pollution was, as stated in the last annual report, discontinued at the end of the fiscal year 1922–23, but the Bureau of the Prevention of Stream Pollution was continued as an administrative unit until July 31, 1924.

In a special report on the Investigation of the Pollution of Streams, published in the last report, three recommendations were made:

1. That the Legislature establish a Conservancy Commission with wide powers of regulation and control of the uses of streams as affecting the quality of the water therein.

2. That further general work on the stream pollution problem should be carried on by such agency instead of the Conservation Commission.

3. That the Conservation Commission should be authorized and directed to continue studies on oyster culture and fish diseases.

The first recommendation was favorably commented on by the Governor in his annual message to the Legislature, but no such legislation was enacted. The second recommendation was in part accepted by the Legislature in that it did not direct the Commission further to pursue a study of stream pollution. The third recommendation was approved and authorized by the Legislature and work along those lines has been carried forward throughout the year, as is elsewhere reported. As above mentioned, the Bureau was finally discontinued on July 31, 1924, when the Chief

Ranger's cottage, Glen Island, Lake George.

thereof was transferred to the State Engineer's office and the remainder of the personnel otherwise assigned in the Conservation Commission.

Gravelly Island and Hermit Island with East Shore Mountain in background, Lake George

To insure a better understanding of the movement for the conservation of our natural resources, our vast natural parks with their wealth of scenery, wild life and wild flowers, and the opportunities for healthful outdoor recreation, Governor Smith proclaimed the first week in April as Conservation Week. The full text of the Governor's proclamation follows:

PROCLAMATION

State of New York — Executive Chamber

Albany

The forests of New York State constitute one of our most valuable and important assets. Once considered inexhaustible, they have been depleted to the danger point and, unless an intelligent policy of replacement and management is adopted, great hardship to the people of the State inevitably must result from loss of business by communities dependent upon them for their industrial welfare, depletion of the wild life of the forests and streams, rapid erosion of our watersheds that will follow the removal of the forest cover and the depriving of hundred of thousands of people who use the forests of the State for health and recreation of the benefits to be derived from them.

The conservation of our forest resources is a subject of vital importance to all the people of the State and a thorough understanding of the subject is necessary.

THEREFORE, I, Alfred E. Smith, Governor of the State of New York, do hereby proclaim the week beginning Sunday, March 30, 1924, as

CONSERVATION WEEK

to be devoted to the education of the public to the benefits to be derived from the conservation of our natural resources particularly to the replacement of our vanishing natural forests by planting state, county and community forests, the reforestation of idle land on farms, and the conservation of our forest areas through the enlargement of our system of great public parks for the health and recreation of the public.

GIVEN under my hand and the Privy Seal of the State at the Capitol in the City of Albany this twenty-fourth day of March in the year of our Lord one thousand nine hundred and twenty-four.

[L. S.]

(Signed) ALFRED E. SMITH.

By the Governor:
GEORGE R. VAN NAMEE,
Secretary to the Governor.

Educational Work

The broad scope of the work of the Conservation Commission, with the variety of activities which concern intimately all classes of people, necessitates a considerable amount of educational work that is closely related to the Commission's administrative functions.

The conservation of the State's immensely valuable natural resources — its forests, rivers, streams and lakes and the birds, animals and fish that live in them — to insure a maximum of use with a minimum of waste, benefits everyone and it is desirable that the public be kept informed of the work that the Commission is doing to the end that all persons in position to do so may cooperate intelligently in such work.

Feeding a pheasant on the Saratoga Reservation.

The press is a great educational agency and its assistance has been sought to keep the public informed of the work of the Commission. The editors and publishers have cooperated generally and heartily in all of the efforts to spread an understanding of conservation. They joined actively in the movement for the reforestation of idle land, the New York State Publishers' Association at its annual meeting at Syracuse in January appointing a committee to work with the Commission in teaching the more profitable use of idle non-agricultural land. During the extreme fire danger to the forests in October and November, papers throughout the State assisted greatly in relieving a trying situation, both through their new columns and by editorials. While the situation was most acute, the Commission sent out, through the press associations, daily news bulletins and clippings were returned from 398 separate publications covering every section of the State.

During the twelve months ending December 1, 1924, 148 news bulletins covering every phase of conservation work were sent to daily and weekly newspapers all over the State, together with special articles and illustrations for Sunday papers, magazines and educational publications.

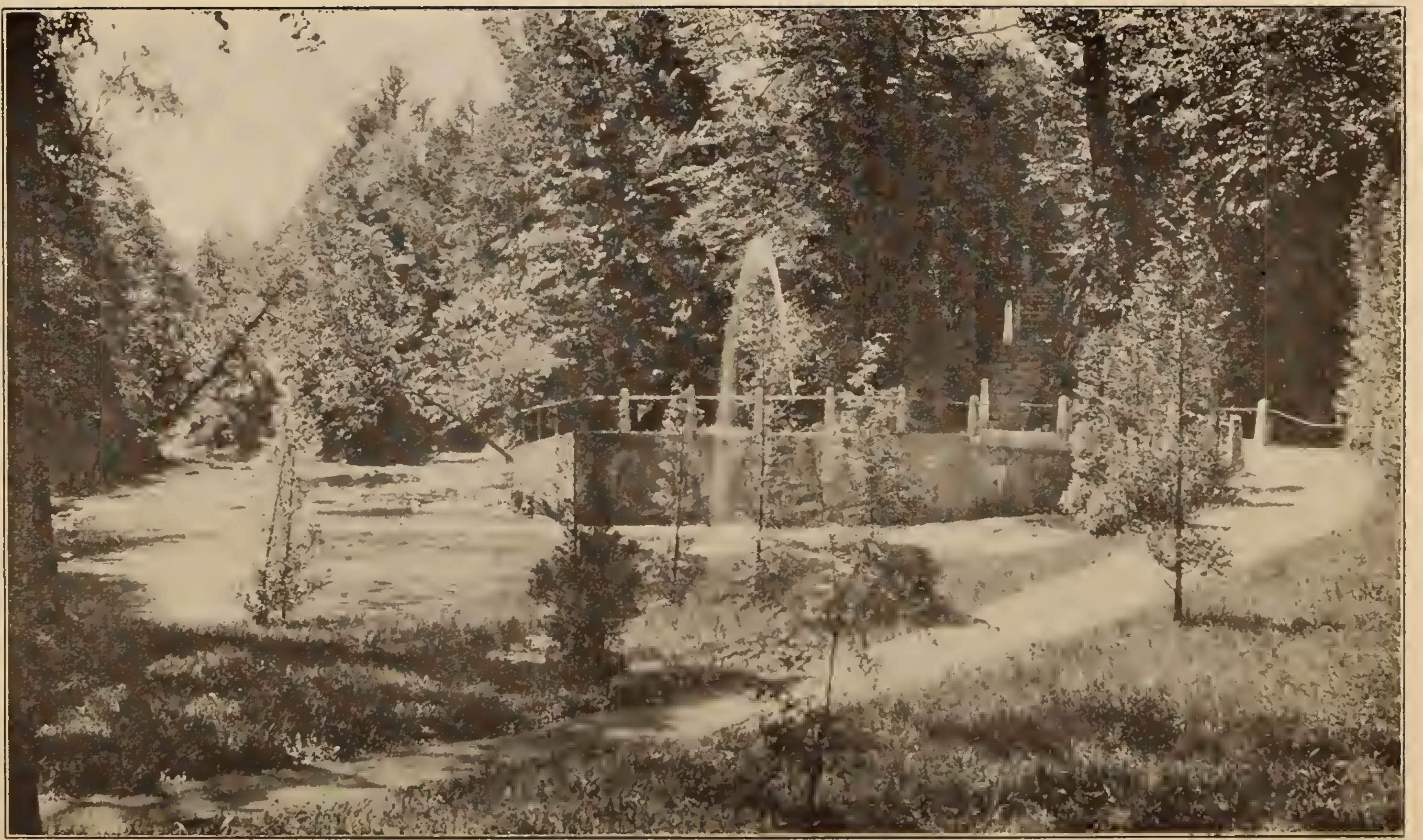
The pine woods make an ideal summer home.

The radio played an important part in the educational work of the Commission during the year, both as a disseminator of news and for broadcasting lectures on conservation subjects. The policy inaugurated two years ago of broadcasting short practical talks on various phases of conservation work has been continued with excellent results during the past year from both WGY, the broadcasting station of the General Electric Co. at Schenectady, and WHAZ, the broadcasting station of the Rensselear Polytechnic Institute at Troy. An average of two talks a month have been given from each station by officers and representatives of the Commission. On March 31st at the beginning of Conservation Week a thirty minute program was put on at Troy at which the Governor's proclamation setting aside the week for the teaching of conservation was broadcast, followed by talks on the State Park System, reforestation, fire protection and other conservation work.

On October 27th, when between thirty and forty fires broke out in the Adirondack forests following the week-end rush of hunters to the woods on October 25th and 26th, fire warnings were broadcast from both stations and these were followed throughout the week by short bulletins and fire warnings from WGY as the seriousness of the fire hazard increased, and finally the announcement of the closing of the woods to hunting and camping the minute the Governor's proclamation was issued. That the radio was effective in spreading this news to remote points in the forest preserve not readily reached through the ordinary channels was evidenced by the fact that when the actual work of closing the woods began, the Game Protectors, State Troopers and motorcycle inspectors of the Motor Vehicle Bureau of the State Tax Department, charged with the duty of enforcing the proclamation found much of their work already done for them. Many hunters who had received word of the issuing of the proclamation were already on their way out and comparatively few were encountered going in. There is no question that the radio bulletins were of great assistance in making the closing of the woods prompt and effective and obviating a great deal of friction that would have been encountered had it not been possible to acquaint hunters in advance with the seriousness of the situation and the need of the proclamation for the preservation of the forests.

While the Commission has no lecturer, it has been its policy as far as possible to supply lectures dealing with various phases of its work to sportsmen's organizations, Boy Scouts, granges, farm bureau meetings, schools, churches, Rotary Clubs, Kiwanis Clubs, Chambers of Commerce, American Legion Posts and other bodies interested in the work. During the twelve months ending December 1st, forty-four such lectures have been given by representatives of the Commission before audiences ranging from 200 to more than 1,000. Owing to the impossibility of filling all demands, it has been found necessary to fix a low limit on audiences to be thus supplied at two hundred.

These lectures have been illustrated both by lantern slides and by educational motion pictures. The Commission has nineteen motion pictures ranging in size from one to three reels which illustrate practically all phases of its work. These pictures are available for the use of all organizations interested in conservation and



A picturesque nook in the Vale of Springs, Saratoga Reservation.

are furnished free of charge to any organization having facilities for showing them, upon condition that no admission fee shall be charged to see them. The demand for these pictures has grown rapidly during the past few years and today far exceeds the ability of the Commission to supply them. The reservation of these pictures from September to May is usually made at least a month in advance of the date for showing them. During the twelve months ending December 1st these pictures were shown before 161 audiences, in several instances being held for a series of meetings covering a week, one of such showings given at the Yale Club in New York City having an aggregate audience of 16,000. During the winter months, pictures illustrating the gipsy moth control work, white pine blister rust and reforestation work are in constant demand, particularly among the farm bureaus, granges and other agricultural organizations, and serve a valuable purpose in the education of that portion of the public particularly interested in these subjects. Other pictures dealing more particularly with the conservation of wild life and the game protective work of the Commission are in demand among sportsmen's clubs. Two new motion pictures dealing with game protective work and the forest preserve have been prepared and will be published just as soon as funds are provided.

1,800 people attended the Forestry Field Day at the DuMond Farm, Delaware County.

DIVISION OF FISH AND GAME

DIVISION OF FISH AND GAME

Llewellyn Legge	*Chief Protector*
John T. McCormick	*Deputy Chief Protector*
Justin T. Mahoney	*Superintendent of Inland Fisheries*
Emmett B. Hawkins	*Supervisor, Bureau of Marine Fisheries*
Sumner M. Cowden	*Field Superintendent*
William Firth Wells	*Biologist and Sanitarian*
Dr. Emmeline Moore	*Investigator in Fish Culture*

REPORT OF THE DIVISION OF FISH AND GAME

When the Division of Fish and Game, on June 30, 1924, closed its books, there ended the most successful fiscal year in every branch of its many and various endeavors in the history of the Conservation Commission. The receipts of the Division during this period exceeded the receipts of the previous year by approximately 25 per cent.

The biggest increase is in the sale of hunting and trapping licenses, moneys received from this source mounting in one year from $275,104.24 to $340,040.14. The next largest increase is in fines and penalties collected by the game protective force where a gain of $30,889.79 was made.

Game Protection

The splendid record made by the game protectors in their many and varied lines of work during the fiscal year of 1923 was this year surpassed in most branches, and those that they failed to better were at least equaled. While the average number of cases prosecuted by each protector remains at twenty-nine, the average recovery collected per protector mounts from $655.15 to $666.77.

The total fines and penalties collected from persons violating the laws of the State of New York giving protection to fish and game during the fiscal year ending June 30, 1924, amounted to $95,047.04.

Though the game protective force in 1924 has been augmented by 41 additional protectors, which means an increase in numerical strength of 45 per cent, the increase in fines and penalties this year over last is over 48 per cent.

On July 1, 1923, those of the protectors that were dropped from the force when the Legislature made available funds sufficient to carry but ninety men and desired to return were reinstated at the salaries they formerly drew, with the same standing in grade. The game protective force is now composed of 131 men, its numerical strength in 1920, before the reduction was made.

These 131 regular protectors, in the past year, settled 3,795 cases of violation of the fish and game laws, the 12 inspectors settled 47 cases, 24 of the special protectors settled 167 cases, and 36 of the State Police settled 108 cases, making a total of 4,117 violations to be prosecuted in this State last year for violating the fish and game laws.

Costs of Court.— The costs arising out of the prosecution of 4,117 cases of violation reported to the Commission, amounted to $8,720.82. Of this amount $261.55 was paid as constable fees and $323.22 as attorney fees. The remainder, or $8,136.05, was paid as costs of court to Justices before whom the cases were determined.

Salt Water Pond, used for the propagation of artificially hatched oysters.

The average cost of prosecuting each case was $2.12. In other words, to collect fines and penalties amounting to $95,047.04, it costs a trifle more than nine cents on the dollar.

Miles Travelled.— If there is any question as to whether the game protectors are active in patrolling their respective territories it would be seem to be answered by the record of miles travelled by the protective force during the past year. The records show that the regular protectors travelled a total of 1,457,701 miles. The average territory of each protector is 380 square miles, and the average number of miles travelled by each protector within this area is 10,878, or about 900 miles every month. The travelling expense money allowed each protector is $900 a year, so it will be seen that it cost the State of New York last year about eight cents for every mile travelled by the protectors. This eight cents per mile included railroad, automobile, livery and boat hire, board, meals, assistance, etc. Considering the variety of expenses covered, an average of eight cents per mile is very low.

Rating of Protectors.— In compliance with section 166 of the Conservation Law, the Commission rated the game protectors into grades, using as a basis for such rating, their work during the year ending September 30, 1924. As a result of this rating, 49 protectors qualified for the first grade, 17 qualified for the second grade and 23 were placed in the third grade. Protectors going into the first grade receive increased pay at the rate of $100 a year; those in the second grade receive increased pay at the rate of $50 per year; protectors placed in the third grade receive no increases and may be removed at the pleasure of the Commission. Protectors in the first and second grades cannot be removed unless furnished with reasons and given a hearing. The basic salary of a protector is $1,200, and the maximum salary to which he may raise himself is $1,500.

The Commission has found that the rating of protectors yearly is a big incentive for them to put forth their best efforts. Their qualifying for the first or second grades depends upon their accomplishments during the preceding year. It is only in this way that a protector may advance himself, and as the number of days worked and violations apprehended are factors in determining his place in the rating, the men are very active in patrolling the territories assigned them. An idea of their activity is to be gained from the average number of miles each protector travels.

The 'Coon is an earnest investigator.

He finds it pays.

"Where the trout leaps quickest to snatch the fly."

THOMAS E. MARSH

Thomas E. Marsh, of Castile, died on August 29th.

Mr. Marsh had served the Commission as a Game Protector for seventeen years. His work of game protection and law enforcement was characterized by thoroughness. He was a game protector not because the position afforded a means of livelihood but because he was a nature lover and desired to protect the wild life of forest, field and water. He was efficient because his interest centered in his duty and effective in that he was intelligent.

Mr. Marsh won the respect and esteem of his associates in the Commission who deeply regret his death.

Special Protectors.—In addition to regular protectors, the Commission appoints special protectors who serve the State in game protection work without pay. The number of regular protectors in the service at one time is regulated by the amount of appropriation made available for this purpose, but there is no limit to the number of specials the Commission may appoint.

There are now 341 specials in the service, located in nearly every section of the state. Special protectors are vested with the same powers as regulars, are not uniformed, and are not required to work any specific number of days, nor are they allowed any traveling expenses. Expenses incurred in the performance of their official duties must be borne by themselves. Though very few of them perform active patrol work, they exert an influence for good among the hunters and fishermen of communities in which they reside. Last year 24 specials reported 167 cases. The fines and penalties collected amounted to $3,180.50.

Nets Confiscated.— To the fines and penalties collected by the protectors from violators of the Conservation Law, there properly should be added $22,297. This is the value of illegal devices confiscated from fishermen. In addition to having to pay fines upon conviction, the devices used in the violations are forfeited to the State. Last year there were seized gills, seines, traps, fykes and scaps to the number of 598. The estimated commercial value of these devices is $22,223. There were also 15 set lines valued at $74 seized because of illegal use. After having served their purpose as evidence, the set lines were destroyed. The nets, however, were retained by the Commission for use at its various hatcheries in collecting fish from which spawn is taken. Thousands of feet of net are used in the taking of spawn and much of this footage is supplied by confiscated nets. Such of the nets as are not adaptable for this purpose or are in such poor condition as not to warrant their further use are destroyed by burning.

While not all the operators of illegal nets or set lines are apprehended, it will be seen that even though they may evade prosecution in court, they do not escape all punishment, for the value of the nets lost in most cases far exceeds the size of fine that would be imposed. The average value of each net last year was $32.00.

Confiscated Skins.— During the year, the game protectors confiscated 418 pelts of protected animals that were being possessed in violation of the Conservation Law. The majority of these skins were seized because they were being possessed during the close season for the taking of the animals from which removed. The Conservation Law does not prohibit the possession of furs during the close season but rather makes such possession presumptive evidence of illegal taking. The protector seizes only such skins as show evidence of illegal taking and if the person from whom taken can prove the pelts were legally acquired and possessed, the skins are returned. Failing in this, the fur is seized in the name of the

Visitors at the fire observation towers have exceptional opportunities to view the country. Observation rock, Hill No. 7.

State and sold to the highest bidder when it has outlived its usefulness as evidence. The sale of these skins brought the state $273.90.

Vermin.— The Commission during the past year continued its campaign of destruction against those animals of our forests that exist by preying upon the other wild life more useful and desirable, and which are protected by the Conservation Law. A list of these animals which are classed as vermin is supplied each protector, who is expected to destroy them whenever opportunity is afforded. For this purpose, rifles are made a part of the equipment of protectors. The animals classed as vermin are as follows:

Common Crow
Goshawk
Weasel
Great Horned Owl
Cooper's Hawk
Sharp-shinned Hawk
Red Squirrel
Red Fox
Hunting House Cat

Of these animals, the game protectors last year killed 3,486. When the destructive habits of these animals are considered, it can be more readily appreciated what an immeasurable amount of good was done the game of the state by their destruction.

Hunting and Trapping Licenses.—For some years past there has been a gradual increase in the number of hunting and trapping licenses sold in New York State. This year, however, the increase was unprecedented, 62,581 more licenses being sold than in the

Collecting maskalonge eggs for the hatchery. Stripping a thirty-pounder.

previous year. The reports show that 332,182 residents and 2,199 non-residents took out licenses to hunt or trap in this state. In addition to these, the Commission sold 651 licenses to aliens to hunt and trap, and realized from their sale, $6,835.50. The total number of licenses of all kinds sold this year to hunt and trap amounted to 335,032, as against 272,451 for the preceding year, an increase of about 23 per cent. The total moneys received from sale of hunting and trapping licenses amounted to $346,875.64, which is $71,771.40 more than the sale of licenses brought last year.

The price of a resident hunting and trapping license is $1.25. A non-resident license costs $10.50. An alien license also costs $10.50. These latter licenses cannot be obtained from county, city or town clerks, but must be secured direct from the Conservation Commission at Albany.

Lost Hunting Buttons.— The principal factor bearing on the falling off of hunting and trapping licenses sold during the fiscal year ending June 30, 1923, was the repealing of the provision of the Conservation Law requiring hunters and trappers to wear a button furnished by the Commission in a conspicuous place on his clothing when afield. This button contained a number corresponding to the number of the wearer's hunting and trapping license. With the passage of the law requiring the wearing of these buttons, the sale of hunting and trapping licenses for the year showed a substantial gain. In the year following the repeal of the law, there were 10,382 less licenses sold than in the previous year, and this in spite of the fact that in every year for the ten previous years, the sale of licenses showed an increase. There are thousands of people in this State, who go hunting only once or twice a year, and to save license fees are willing to take a chance on these occasions, feeling the probable chance of being apprehended is small. When a button containing number of license is required to be worn on the person, in addition to the carrying of the license when afield, this class of hunters hesitate before hunting without first complying with all requirements of the law, knowing that in the absence of the telltale button it is common knowledge to every person met afield, they are violating the Conservation Law. When the license button provision was again put into the law, the sale of licenses that year jumped from 272,451 to 334,032, a gain of 62,581 licenses sold.

If a hunting and trapping license button is lost, a duplicate may be obtained from the Commission. During the past fiscal year, the Commission replaced 190 lost buttons at the cost to the hunters of $28.50.

The Commission issued licenses to 651 unnaturalized foreign born persons to hunt in this state during the year 1924. A fee of $10.50 is charged for an alien license, and from their sale during the fiscal year ending June 30, 1924, the Commission realized $6,835.50.

When this law was placed on the statute books in 1922, a big step was taken toward conserving the song and insectivorous birds. At the time the passage of the law was under consideration, it was estimated that fully ninety per cent of the non-game birds taken in this state were killed by unnaturalized foreign born persons. Reports of wanton slaughter of these birds, no longer find their way to the Commission. Now before the Commission will issue an alien license, the applicant must prove to its satisfaction that he is a fit person to go afield with a gun in this state. The small number of licenses yearly issued reflects the care taken to see that licenses are issued to law respecting persons only.

Opening a shipment of trout eggs at a State hatchery.

Hunting Accidents.— The number of casualties in the hunting field this year was smaller than a year ago which was due largely to the fact that during two weeks of the deer hunting season the fire towns in the Adirondacks and Catskills were closed to hunting and camping because of the excessive fire hazard due to protracted drought and an unusually heavy fall of leaves which greatly increased the danger of forest fires.

Seventy-three casualties were reported of which ninteen resulted in death. Nearly all of these accidents resulted either from the accidental discharge of hunters' guns or from being shot by a companion.

Thirty-six were shot by a companion and twenty-nine were killed or injured by the accidental discharge of a gun. In a great majority of cases these latter casualties were shotgun accidents.

Six persons were struck by stray bullets and two were found dead in the woods.

Frank Bray, a guide of Gile, N. Y., was found by a party of hunters on October 24th about two miles from the Blue Mountain House with a bullet wound in his heart and another in his chest. None of the hunters in Bray's party had fired a shot during their stay in the woods and had no knowledge of who was responsible for the shot or whether it was accidental or the work of an enemy. The case is being investigated.

The other hunter found dead was Raymond Parker whose body was found in a ravine on a farm near Alexandria Bay with his head partly blown away from a shotgun wound. He had been hunting rabbits.

Forty-one of the accidents reported occurred prior to October 31st, the date on which the Governor's proclamation closing the fire towns in the Adirondacks and Catskills to hunting and camping went into effect, and twenty-seven occurred subsequent to that date, all of them occurring outside of the fire towns.

The number of deer hunting accidents reported this year was unusually small, while the number of accidents to hunters after pheasants was comparatively large.

The accidents resulting from the accidental discharge of guns indicated in most instances either lack of familiarity with fire arms or failure to take proper precautions in carrying and handling them.

Twenty hunters were either mistaken for game or got in the line of a companion's fire.

Non-resident Fishing Licenses

In New York State, non-residents are required to take out fishing licenses to take fish with hook and line in all waters of the state except international boundary waters. Residents of Canada are not obliged to take out New York State fishing licenses to angle in the part of such boundary waters under the jurisdiction of this state as long as the Dominion of Canada does not exact licenses from residents of New York State to angle in the part of the boundary waters not under the jurisdiction of New York State. Of non-resident fishing licenses there were 9,573 issued last year. The sale of these licenses brought the state $18,370.61, as compared to $15,080.42 for 1923, a gain of $3,290.19.

While the number of non-resident licenses issued each year has increased since the law requiring them was placed on the statute books, the 9,573 persons who took out licenses in 1923, is only a small percentage of the number of non-residents who, each year, fish with hook and line in this state. That a greater number do not take out these licenses is due to the inability of the protectors to effectively enforce the law. Residents of the state are not required to take out licenses to angle, and the protector has no way of distinguishing non-residents from residents. What cases have been prosecuted by the protectors for angling without licenses, have been cases where the angler admitted he was a non-resident and that he did not possess a license. The solution of the problem would seem to lie in providing for a combination hunting, trapping and fishing license for residents of the state, something that has been advocated in this state for many years, and a law that would meet with much favor among the sportsmen. With such a law on the statute books, the number of non-resident fishing licenses to be yearly issued would be closer to 100,000 than 9,473, the number issued last year.

Lake trout in cold storage. Some weigh as high as 35 pounds.

Guide Licenses

While prior to 1924, the law made provision for guide licenses, the taking out of same by a person desiring to engage in guiding was optional. At the last session of the Legislature, the law was amended. It is now mandatory upon every person engaging in guiding others in forest preserve counties, whether for hire or not, to submit to examination by the Commission to determine his fitness to hold a license. The Commission will not license a person as a guide who is not skilled in the use, management and handling of such boats or canoes on lakes, ponds, rivers or other waters, as are used in the territory in which he seeks to operate as a guide, and who is not, in its opinion, a safe and competent person under all circumstances to be a guide for camping, hunting or inland fishing parties. The Commission publishes a list of all licensed guides which may be obtained upon request. For any person not licensed by the Commission to engage in guiding others in forest preserve counties is a misdemeanor, punishable upon conviction, by a fine of from $10 to $100.

There were four hundred and fifteen guides licensed by the Commission between January 1 and June 30, 1924. The cost of a guide license is $2 and from this sale, the Commission has thus far received $830.

Spearing

Between February 14 and November 30, spears may be used in certain waters of the state in the taking of carp, suckers, mullet, dogfish, catfish, bullheads and eels, which fish are recognized as injurious to the propagation of other more desirable species. No license is required by a person to avail himself of the privilege of spearing between these dates.

Some skunks are pets. All are valuable fur bearers.

To spear in the Niagara River between the lower steel arch bridge and the suspension bridge at Lewiston Heights, a license, cost of which is one dollar, is necessary. Between these points a person holding a spearing license may take at any time, all species of fish other than trout, black bass, pickerel and maskalonge, for which the season is open. Such fish, however, shall not be less than the length prescribed by the Conservation Law. Net moneys received from sale amounted to $134.40.

Trout Hatcheries and Tagging

In New York State there are two species of fish, the sale of which is at all times prohibited. These fish are trout, including the speckled, brown, rainbow, steelhead, red-throat and brook varieties, and the black bass, which includes both the large and the small mouth. Provision, however, is made for the selling of trout which are raised under artificial methods and which have been tagged through the tail with a seal by means of a machine furnished by the Commission. Provision is not made for the tagging and selling of black bass. This species of fish cannot be raised artificially in hatcheries, as their spawn cannot be taken from them. No such difficulty is experienced with trout, and many hatcheries are located in this and adjacent states, raising this species both for consumption and for stocking purposes. The Commission licenses and furnishes with tagging machines only such hatcheries as have ample facilities for the artificial propagation of fish. Thirty-four such hatcheries were licensed last year. The license fees for the first year is the actual cost of machine. Every year thereafter, the renewal fee is $1.00. One cent is charged for tags used. Two hundred and three thousand trout were tagged last year, which netted the State $2,030.

License to Import Game — Section 377

The purchase or sale of game protected by law in this state is at all times prohibited. That those who are unable to avail themselves of the hunting and fishing privileges provided in the state and take their own fish and game, the law allows the sale and purchase of most species when raised under a license. Game raised under one of these licenses, before being sold for consumption, must be tagged with an indestructible seal. These seals are placed on the game at the time of killing by a representative of the Commission.

Provision is also made in the law for the tagging of protected fish and game that has been raised on game farms in other states. and for the tagging of game coming from without the United States. However, before the Commission will license a farm outside the state or tag its game, it causes an inspection to be made to determine that the game raised in captivity was killed under a breeding law similar in principle to that of this state. A charge of five cents is made for each tag used. The state collected $13,574.95 from the sale of these tags last year.

There are two hundred and one farms within the state raising game for food purposes. This is nine more than were in operation last year. There are four farms licensed by the Commission without the state. A charge of $5 is made for a breeder's license and it runs until the 31st day of December of the year of issue.

Dogs in Deer Forests

The taking of dogs into the Adirondack or Catskill parks or into forests inhabited by deer, or the harboring or possessing of them therein, is not allowed. The reason for this is that the use of dogs in the taking of deer is prohibited by law, and that dogs, if permitted to run at large, will chase deer. However, as there are many species of game inhabiting these forests the taking of which with the aid of a dog is not prohibited, and as many vacationists and tourists visit these parks, taking with them dogs of various breeds other than those used in hunting, the law provides for the licensing of dogs to be taken into the parks or into deer forests. A license permits the holder to possess and use a dog in deer forests in the taking of such game as the use of a dog is not expressly prohibited by the Conservation Law. The licensee must have his dog under control at all times, and not permit it to run at large in deer forests unaccompanied. Any person may kill a dog found running at large in forests inhabited by deer, and no action for damages shall be maintained against the person for such killing. During the year ending June 30, 1924, there were 4,504 of these licenses sold by the Commission. This is 1,482 more than were issued last year.

Importation Licenses

Protected fish and game may be transported only within this State during the open seasons therefor. To transport such fish or game from one point within the state to another, it is necessary that a shipping permit be attached thereto. Only the bag limit of one day may be shipped at one time. A person is eligible to receive six of these permits in a year, and same may be obtained upon application to the Conservation Commission. Non-salable fish and game may be imported from without the state during the open seasons therefor in this State, and shipping permits are not required to be attached. To import into this state, fish and game for which the season is closed, or fish and game for which there is no open season in this state, an importation license is required. This license costs $1.00 and allows the holder to import into this state, the amount that may be legally exported from the State where taken. All fish and game imported must be accompanied by the taker, except quadrupeds which may be shipped by common carrier, but in this case, importation permits must be attached. During the year, the Commission sold 967 importation licenses.

License to Possess Venison

From the sale of licenses to possess venison after the close of the open season for deer, the Commission received $445. A person legally taking a deer in this State may possess the same until November 20th, which date is five days after the close of the open season. If the deer is to be legally possessed beyond this date, a license is required. This license costs $1 and is issued by the Commission and allows the possession of the deer until February 1.

159–1 Licenses

The Commission issued licenses to 77 persons to collect specimens of wild life for scientific and public exhibition purposes. If the licensee is collecting for a duly chartered museum or society incorporated for scientific purposes, no charge is made for license. If licensee is gathering together specimens, aiming to establish a private collection, a charge of $1 is made. However, before a license is issued to such a person, steps are taken by the Commission to satisfy itself that applicant is sufficiently equipped along ornithological lines to carry on work of this nature. During the past year only twenty-nine licenses were issued for which a charge was made.

159–2 Licenses

The Conservation Law, in section 159–2, makes provision for the possession of wild animals, fish and birds for purposes of propagation, science and education. During the year ending June 30, 1924, the Commission sold 683 of these licenses. This is 100 more licenses than were issued last year.

Licenses to Propagate Fur-bearing Animals

The raising of wild fur-bearing animals in captivity, due to the selective methods of breeding employed, not only works to improve persons who contemplate engaging in the business of raising furbearers for commercial purposes. It freely gives advice as to laying out of farms, construction of pens, matings and where breeding stock may be obtained. The increase in the number of licenses issued last year over the preceding year reflects the success of the efforts of the Commission to interest people in this line of husbandry. Last year there were twenty new fur farms established in this State, bringing the total of farms under the jurisdiction of the Conservation Commission up to seventy. A license to operate a fur farm in the State costs $5. From the sale of licenses last year, the Commission received $350.

Fur-bearing Animals

Most of us have at one time or other read books which told of fearless men braving the perils of little frequented regions, unwaveringly risking life and limb, and also have seen pictures portraying rugged men of the ice-clad north, who eke out an existence, enduring untold suffering and hardship in pursuit of furbearing animals, and have then contrasted this with the appearance of mannikins in show windows, arrayed in luxurious fur garments giving every appearance of comfort, warmth and security from cold.

Perhaps the pelts, which went to make up the beautiful fur garments you admired, were taken in the wilds of the frozen north country, but the probability of their having been taken in New York State is equally as great.

Juanita Island, Lake George, is a favorite spot for campers.

Most every species of fur-bearing animal, the pelts of which are in any way used in trimming, lining, or fashioning fur garments, are to be found in New York State, most of them afforded rigid protection under the Conservation Law.

Bear, muskrat, skunk, raccoon, mink, sable or marten are protected fur-bearers in this State and their taking permitted only during certain periods of the year.

Fox, otter, fisher and bobcat are the fur-bearers that are not protected and may be taken at any time. The habits of these ani- the species but acts to lessen the drain on the wild animals in their natural habitats. The Commission offers every encouragement to mals are recognized as hostile to the continuance of our more useful species and while their complete extermination would be unwelcome, their alertness and capacity to meet all requirements, make further protection unnecessary.

Brown Trout Caught by E. R. Hayes, Loon Lake, Franklin County. Length 33 inches, width 9¼ inches, girth 21½ inches, weight 19 pounds.

Hudson seal coats are not made from the pelts of amphibious animals captured in the waters of Hudson Bay as many people think. Hudson seal coats are manufactured from dyed muskrat pelts, and the best grade of coats are made from the pelts of rats taken along the creeks of central New York. The skins are plucked, dyed, dropped and cut in such a way that each skin dovetails into another, thus getting away from the seamy effect characteristic of the muskrat coat made up of natural skins.

A woodland trail

The dropping process is used to lengthen the skins, and each skin is "dropped" a great many times. This process is also used to get variation in style. If skins were used in their natural shape, the manufacturer would be limited to a very small number of styles.

Those black, bushy collars and cuffs with the long lustrous hairs that glisten in the sunlight, that are seen on seal coats, are made from the fur of the skunk. The habitat of this little, despised animal includes most every farm in the State. Many a farmer's boy depends on his catch of skunks in the open season for his pocket money throughout the year. Thousands of these animals captured by boys find their way into the fur markets each year.

The fox pelts go to make those rich, luxurious fur scarfs with the long, soft and glossy hair, giving the appearance of life and warmth.

And so it continues. Whether the fur is required for coats, scarfs, muffs, chokers, lining or gloves, animals are to be found in this State to produce it.

Some idea of the immense resources of the Empire State in fur-bearing animals is reflected in the figures published by the Raw Fur Dealers Association, showing the yield of one season, and its value in the raw state:

225,000 skunks	$562,000 00
400,000 muskrats	400,000 00
25,000 raccoons	100,000 00
15,000 foxes	105,000 00

The estimated combined commercial value of the take of furs annually in the raw state is over $1,500,000.

These furs have a commercial value, when finished, of over $5,600,000.

Protection Given to Bear

Prior to 1923, bear was not protected in this State and could be taken at any time and in any number. Under this law, bears had become so scarce in some sections of the State as to lead many sportsmen to believe they were being depleted so rapidly that unless something was done to give them some measure of protection, they would, in a few years, disappear entirely. By virtue of chapter 376 of the Laws of 1923, bear was included among the wild animals of this State protected under the Conservation Law. Section 193-c now fixes the open season for bear from October 15th to November 15th. During this period, only one bear may be taken by a person. The trapping of bear or the taking of it in any manner, other than with a gun fired at arm's length, is prohibited. The use of jacklight or other artificial light, saltlick or other device to entrap or entice bears is prohibited, as is also the use of dogs in their taking.

The public camp site at Lewey Lake is popular with anglers.

Game Bird Farms

It is commonly known that the game birds native to this State are not as plentiful in our covers as they were twenty or thirty years ago. No one thing is responsible for this, but rather it is the result of many contributing causes, the more important being the diminishing of our wooded areas to meet demands for building material and the clearing of natural bird covers to make room for agriculture. Another thing equally as harmful is the large number of people hunting today. A comparison of the number of hunting and trapping licenses sold in this State in 1924 with the number sold in 1922, a period of two short years, best illustrates how rapid has been the increase. In 1922 there were 282,833 licenses sold, while during the fiscal year ending June 30, 1924, there were 334,381 licenses sold. This indicates that there were 51,548 more hunters afield this fall than there were two years ago, and 133,381 more than were afield in 1914, in which year 201,000 persons were licensed to hunt and trap.

With a steadily increasing number of hunters each year hunting in more and more limited covers, the Commission, as far back as 1909, appreciated that something must be done to relieve the drain on our native birds and decided to introduce a bird into the State which would inhabit the more open areas, thus attracting hunters into the open spaces and relieving in some measure the demands made on our grouse and other native birds. For this purpose a game bird farm was established at Sherburne, Chenango county. Here the first ring-necked pheasants for stocking purposes in the State were raised.

Game bird raising on a large scale in New York State at this time was something new, but the work met with the instant approval of the sportsmen. From the beginning the Commission has never lacked cooperation from the sportsmen or from the farmers, upon both of whom it depends to a large extent for the distribution and hatching out of birds and eggs.

From the beginning the work of producing pheasants and pheasant eggs in this State was a success. With an occasional exception, the output of the Sherburne farm each year shows an increase over the preceding one. When the demand for birds and eggs became so great that the output of the Sherburne farm was not sufficient to meet it, additional farms were established in Jefferson and Suffolk counties.

The process of changing these farms, which were equipped for dairying, into bird-raising farms has been gradual, and with the exception of the Long Island farm, on which there still remains a few acres of land to be cleared, is now about complete. On the Long Island farm it has been found necessary to lease a few acres of adjoining land, but when the farm wooded areas are cleared, this will no longer be necessary.

While the principal labor on these farms is pheasant raising, this alone does not sum up the total operations. The food consumed

Thousands of campers enjoy this public camp site on the banks of the Sacandaga River.

by the pheasants and chickens on the farm is enormous, and were it all purchased in the markets, the price of producing birds would mount to a point where it would be cheaper to buy the birds and eggs from pheasant raisers. The price of pheasants, like that of every commodity, is regulated by supply and demand, so it is doubtful if 12,000 birds and 150,000 eggs could be purchased by the State for liberation and hatching at treble the present quoted prices.

What brings about the low cost of producing birds and eggs on the Commission's farms is that much of the food consumed by the birds is raised there. Acres of corn, wheat, buckwheat, oats, barley and green food are cultivated. The cultivation of part of the farm is quite necessary, as it is in that way the ground is kept free from such diseases as attack the birds, and foraging ground provided where the chicks may seek insect life which is so indispensable in their diet during the early weeks of life. These fields also afford the young protection against hawks and other preying vermin.

The principal benefit known is that it affords the young birds a habitat similar to that which they would have during the first four or five weeks of their life if hatched out in natural covers. If birds are hatched and kept penned up for any length of time before liberation, they become semi-domesticated and, of course, when liberated are much more easily approached than birds hatched in the wild. But on the farms only such birds as are to be kept for breeding purposes are thus kept, the remainder being allowed free range until about the time they are ready to shift for themselves when they are trapped up and made ready for shipment. Often when a brood of birds is not of sufficient size to care for themselves, the hen, which had been acting as foster parent, is sent along. When young pheasants are received in this way all are released together in the covers it is intended to stock. The young birds will stay with the hen until big and strong enough to look after themselves when they will leave her, the smallest and weakest being the last to set out.

During 1924 there were 148,600 eggs produced on the farms, and 12,405 pheasant chicks hatched and brought to liberating age. Of the eggs produced, 123,600 were distributed to 780 applicants. Of the birds raised, 10,280 were alloted among 696 applicants. These applicants were located in every county of the State with the exception of New York, Bronx and Chenango. Pheasants or pheasant eggs are not furnished to applicants in Chenango county, as enough birds escape from the Sherburne farm each year to amply supply the needs of the county. There are no bird covers in Bronx or New York counties.

In point of production this is the biggest year of the farms. While the number of birds distributed has, on one occasion, surpassed the number sent out this year, the number of eggs distributed is 7,882 larger than were distributed in any previous year. In addition to pheasants distributed, there were 2,125 choice speci-

Uncas Island, Lake George, one of the State-owned islands.

mens retained on the farms for propagation purposes. It is by this method of selective breeding that the type of bird is improved. To assist in this work, wild pheasants are occasionally imported from China. On the three farms there are now 3,700 selected birds, all strong, healthy and vigorous types. It is from these birds that the eggs of next year will be produced. New breeding stock is introduced each year, and no bird is kept longer than three years. The pheasant breeding stock is valued at $17,500.

The market value of each egg produced on the farms is placed at 30 cents, of each bird shipped for stocking purposes at $3.50, and each bird retained for breeding at $5. Using these figures, which compare favorably with the prices in the open markets, the value of eggs produced this year is $44,580, and the value of birds $46,605, making a total value of the output of the three farms $91,185.

As in past years, many Fish and Game Clubs of the State lent valuable aid to the Commission by taking large allotments of eggs and distributing them to their members, who were charged with the duty of seeing they were hatched out and the chicks brought to liberating age. That no delay would be experienced in getting the eggs under hens at once, the clubs this year were notified a week in advance of shipment of the number of eggs allotted.

Quite a few clubs sent representatives to the game farms for instruction in the setting of eggs and the caring and breeding of the young until the arrival at liberating size. So many persons came for instruction that the Superintendent of Game Farms laid out a systematic course designed to give the greatest amount of necessary knowledge regarding the propagation of pheasants in the shortest time. This knowledge is, of course, passed on by these representatives to the members of their respective clubs engaged in the actual work of hatching the eggs.

Visitors are always welcome and each year thousands of automobilists and other sightseers visit the farms. Among those to inspect the farms this year was a delegation of foreign professors who were very much interested in the work and surprised to learn that it was carried on on such a big scale. Other visitors to the farm were Dr. McAltie and Dr. Stoddard of the Bureau of Biological Survey, Agricultural Department, Washington, D. C. The doctors came to study the manner of housing the birds and methods of breeding.

Bureau of Inland Fisheries

During the year of 1923, the Bureau of Inland Fisheries issued 2,211 licenses to persons to operate nets in the different waters of the State open to the taking of fish for commercial purposes. The devices licensed include seines, scaps, fykes, traps, machine traps, stake nets and gill nets.

The aggregate amount of fish taken by licensees, as reported by them, amounted to 8,843,943 pounds. For this catch they reported receiving $700,141.28.

There were more fish taken in 1923 than during any year since the Commission discontinued its policy of licensing nets for use in the Finger Lakes in the taking of fish for commercial purposes. The catch of fish last year was larger by 2,471,607 pounds than the catch of the previous year, which in dollars and cents means that the fishermen had $219,088.75 more to divide for the season's work of 1923 than they did in 1922.

The total moneys the fishermen reported receiving for their product in 1923 amounted to $700,141.28, and as there were 2,211 licenses issued by the Commission during this period, it means that each license earned slightly more than $316.66.

The total amount of moneys received by the Commission in license fees from the fishermen during the fiscal year ending June 30, 1924, was $24,216.74. The average cost of a net license is less than $11, which is about 3⅓ per cent of the average amount each license earned.

Hudson River.— The total catch of fish of all kinds reported taken from the waters of the Hudson river during the calendar year of 1923 was 553,557 pounds. The commercial value of this catch was $81,652.21. This is not, however, the total catch of fish as only about 80 per cent of the fishermen have up to this writing made a report covering the result of their operations in the river last year.

As is the case of late years, the species of fish in the river to yield the greatest poundage was the carp. In 1923 there were reported taken 231,429 pounds of carp having a value of $32,199.52. The market for carp was exceptionally good in 1923, the fishermen averaging between thirteen and fourteen cents per pound for their fish. Carp taken from the Hudson river and adjacent waters bring higher prices because of delivery being made alive to the large fish markets of New York city.

The other species of fish reported taken, which went to make up the reported 553,557 pounds for the river, were: Suckers, 112,270 pounds with a value of $13,600.02; striped perch, 24,381 pounds, valued at $2,774.66; bullheads, 20,797 pounds, which sold for $4,349.38; sunfish, 3,310 pounds, valued at $357.71; frostfish, 3,112 pounds, $275.50; pickerel, 479 pounds, $91.40; eels, 6,706 pounds, $1,060.88.

There is also to be added to the above 78,601 pounds of shad having a value of $18,729.92. In the early years of shad fisheries in the Hudson river, the taking of 78,601 pounds of shad in one net in a season would not be considered an unusual catch. But the take of shad for several years back has been diminishing. In 1915, when the smallest catch ever recorded along the river was taken, totaling only 24,209 pounds, it was confidently prophesied then that the end of the shad fisheries in the Hudson was not far off. However, from that time on to 1918, when the jurisdiction of the Commission was extended so as to take in that part of the river lying to the south of Verplanck's Point, a gradual increase in the catches was noted.

Two well-kept camps.

Prior to 1918, the Commission had no authority to regulate netting in the Hudson river south of Verplanck's Point. Nets in this stretch of the river could be used in any number, of any construction and having a mesh of any size. The first act of the Commission, upon being given power to regulate netting the entire length of the river, was to provide that no net having a mesh smaller than two and one-quarter inches could be legally used. A net having a mesh of this size will allow immature fish to escape, thus assuring them an opportunity to reproduce at least once.

The following year, 1919, the report of shad taken mounted to the unexpected and entirely unlooked-for catch of 257,826 pounds. Since that date it has been steadily diminishing, each year less being taken than in the previous year with the single exception of 1922, when 14,497 pounds more were taken than in 1921, but still this catch was not as large as that of 1920.

Last year the catch dropped to 78,601 pounds, and next year, when the story of this year's catch is told, fear at this time is felt that the smallest catch in the history of the river will be recorded. It is very doubtful if 15,000 pounds of shad were taken in the river this year.

While many reasons have been set forth for the disappearance of shad from the Hudson river, it is doubtful if the decline can be attributed to any one particular thing. Conditions have changed entirely from what they were in the Hudson twenty or thirty years ago. Thirty years ago the Hudson was not the polluted stream it is today. There was not nearly the footage of nets in the river that there is today. There were plenty of natural spawning beds in the river that have since been ruined by the operations of dredges in deepening channels. There were not the number of fast propelled boats plying the waters, which wash the spawn on shallow beds, nor was the carp, the greatest of all menaces to fish reproduction, as firmly established as they are now. Today carp predominate in the Hudson river and in many years the catch of this fish is greater than the combined catch of all other species.

To improve the shad fisheries of the Hudson, the Commission has established a hatchery at Linlithgo from which it yearly distributes about 1,500,000 young shad, hatched from spawn taken from the fish netted from the river.

On the principal remaining spawning grounds, a submerged island located between Kingston Point and Barrytown, the Commission has placed buoys and prohibited netting thereon during the shad season, and has arranged with the steamboat companies having boats plying the river, to slow down while passing these beds. While this has a tendency to help shad conditions in the Hudson, the drawback to doing anything worth-while to improve these fisheries is their way of ascending the river only during the spawning period, and it is only during their upward migration they can be successfully taken. Were the Commission to prohibit the taking of shad until after the spawning season, only an occasional fish would be taken, and as the shad is a migratory fish,

A highway camp site.

very little good would be accomplished by a step of this kind unless similar action was taken by other States along the Atlantic coast.

The herring taken in the Hudson in 1923 amounted to 50,747 pounds. The value of the catch is $3,713.94. The fishermen averaged about seven cents a pound for their catch. These fish are now sold by the pound. Years ago, when they ascended the river in countless numbers each spring, they were sold as low as 10 cents a dozen.

The combined value of the shad and herring taken from the Hudson in 1923 is $22,443.86. However, for the fishermen it is still a profitable industry. While they do not catch the quantities of fish they did, the prices have about risen in proportion to the falling off of the catches. There are only about one hundred fishermen on the river who fish for shad and herring for commercial purposes. While the season for the taking of shad extends from March 15 to June 15, the fish rarely make their appearance in the river before May, and in the vicinity of Kingston and Barrytown, it is often later when they arrive, so an average of three hundred dollars per net from shad and herring cannot be said to be unprofitable. It must not be assumed that this is all the net makes during this period as other fish are also taken.

The price of license to operate a gill net in the Hudson river up to and including 2,000 feet in length is $10.

Another fast disappearing fish from the waters of the Hudson is sturgeon. In 1923, there were but 18,429 pounds valued at $33,559 reported taken. In 1922, the catch of sturgeon of all kinds in the river amounted to 29,454 pounds.

During the spring of 1924, the Superintendent of Inland Fisheries personally planted 500,000 young pike perch and 500,000 ciscoes in the Hudson river above the Troy dam. The river is at present inhabited by pike perch but the introduction of the ciscoes is an experiment.

Lake Erie.— The fishing seasons of 1923 on Lake Erie were equal to that of several years ago, which was a record. The report of one company fishing out of Dunkirk and operating six boats shows 2,578,568 pounds of fish, having a value of $150,000 as having been taken. This is an average of $25,000 per boat. As the fishermen are employed on shares, a large part of this money went to them.

On Lake Erie, during the year 1923, the Commission licensed 68 power, row and sail boats to be used in operating gill nets. It also licensed 24 trap nets. The holders of these licenses reported taking an aggregate of 7,164,782 pounds of fish, and receiving $462,441.95 for it.

It would appear from these figures that the industry enjoyed its best year. With only 81 licenses issued by the Commission in these waters, each license earned an average of $5,709.16.

Lake Erie is the one body of water in the State that is extensively fished for commercial purposes, and each year continues to yield a greater supply. This condition is attributable in a large measure to the establishment by the State of a fish hatchery at Dunkirk. This hatchery was established in 1919 when the first eggs were hatched and the young fish planted in Lakes Erie and Ontario. Since 1919, the Commission has each year planted from 50 to 100 millions of ciscoes in Lake Erie.

How this system of planting has affected the fish supply of the lake is best told by a comparison of the catches for the years 1921 to 1923. In 1921, the catch was 2,339,087 pounds; in 1922, 3,803,112 pounds, and in 1923, 5,781,138 pounds. It must not be believed that 5,781,138 pounds of ciscoes were all that could have been taken. In the summer of 1923, the large fish houses in and around Dunkirk were limiting the fishermen as to the number of pounds they would take from them in a day.

This practice of "limiting" the fishermen as to pounds of fish they will take is a vicious one. Regardless of where the limit is placed by the fish houses, the fishermen continue to set the usual footage of nets, and when running the nets the following day, if the first strap of nets yields the amount of fish the houses will take, the remaining straps are not hauled but permitted to remain in the water until the following day or perhaps longer. Fish that are gilled in a net do not live for any length of time thereafter, and after death are in a short time so soft as to be unmarketable, and are not even, in many instances, brought to port. Thousands of fish are in this way unnecessarily destroyed in Lake Erie every year.

To save as many fish as possible to the lake, the Commission last year passed an order making all licenses in Lakes Erie and Ontario expire on December 20. Conservationists of Erie, Chautauqua and other counties bordering on the Great Lakes, had been protesting against the practice of fishermen allowing their nets to freeze in the ice. When a net freezes in, it fishes a greater part of the winter, the net continually filling with fish, which die, rot out and are replaced by others. Last winter being such an exceedingly mild one during the latter part of December, and the Commission not wishing to unnecessarily restrict the activities of the fishermen, amended its order so as to permit them to operate beyond December 20.

The object of the Commission in ordering the nets removed December 20 was not because it felt the ciscoes were in need of additional protection, as they are apparently more plentiful today in Lake Erie than they were five years ago, but to guard against the freezing in of nets. It is told that one spring so many nets had been frozen in during the winter they washed ashore, some wrapping about the water intake of the city of Dunkirk, and for a time shutting off the water supply of the city.

The fishermen also reported taking 1,088,595 pounds of pike perch during 1923. For this catch they received $53,223.84.

The lake trout taken amounted to only 2,581 pounds valued at $225.36. Other fish taken were 8,337 pounds of sturgeon valued at $4,167.65; 38,849 pounds of suckers valued at $1,388.38; 5,783 pounds of carp valued at $182.50; 1,105 pounds of bullheads valued at $90.60; 30,000 pounds of eels valued at $1,800; 90,685 pounds of frostfish valued at $5,441.

Of whitefish, there were 117,837 pounds taken. The fishermen reported receiving for this catch $26,461.23, an average of about 23 cents per pound.

Lake Ontario.— New York State's biggest water frontage is on Lake Ontario, and while more licenses are issued to operate in this lake than in Lake Erie, there is nearly twenty times as much fish taken from Erie. Last year the Commission issued 108 licenses to fishermen to operate nets in Lake Ontario, and the licensees reported taking but 391,156 pounds of fish, and receiving therefor $64,428.57.

This is an increase of 25,618 pounds of fish over the preceding year, but is not nearly the poundage that the lake should yield, considering the abundance of fish therein, particularly ciscoes. Many explanations are given as to why so few fish are taken with nets in Lake Ontario, but a theory having considerable weight with the Commission is that fishermen are obliged to operate at too great a distance from shore. The law regulating netting in Ontario provides that fish shall not be taken with nets within one-half mile of the shores or islands thereof, nor within one mile of the mouth of the Niagara river, except that between October 15 and December 15, ciscoes may be taken to within 500 feet of the shore, and to within a radius of 1,000 feet of the mouth of any river, bay, inlet or outlet.

A law restricting net fishing within one-half mile of the shore is a proper one for Lake Erie, but there is a question of whether such a law is the proper one for Ontario. Operating one-half mile or at even greater distances from shore in Lake Erie, the fishermen using "bull" nets of 100 to 125 meshes deep are able to fish somewheres near the top and bottom. Using similarly constructed nets in Ontario at distances of one-half mile or further from shore, except in limited areas, the nets are neither near top or bottom. In Ontario, to get good catches, the fish must be running at the level at which the nets are set. Of the 391,156 pounds of fish taken in Lake Ontario last year, fully 70 per cent of it was caught between October 15 and December 15, when netting is allowed within 500 feet of the shore.

In Lake Ontario, between Horse Island and Tibbits Light, in the county of Jefferson, netting is permitted at any distance from shore from October 1 to May 31. In this limited area between these dates, some years equally as much fish is taken as are taken in the remainder of Lake Ontario.

If the law regulating fishing in Ontario were amended so as to permit the operation of nets to within 500 feet of the shore at all times when netting is permitted by the Commission, the lake undoubtedly could be made to yield a much larger supply of fish without in any way endangering the continuance of any species therein.

The State boat "Banshee" off Phantom Island, Lake George.

The principal fishery in Lake Erie is the ciscoe, while in Lake Ontario it is the whitefish. There were but 58,788 pounds of ciscoes taken in this lake, while there were 81,097 pounds of whitefish reported taken. For the ciscoes the fishermen reported receiving $3,634.30, an average of six cents per pound, and for the whitefish they report receiving $13,525.57, an average of over sixteen cents per pound.

In Ontario, there were 26,093 pounds of lake trout taken as against 2,581 pounds of this fish taken from Lake Erie.

Of pike perch there were 154,017 pounds reported taken, having a value of $28,556.82. The sturgeon taken amounted to 6,093 pounds, having a value of $2,995.23; pickerel, 3,378 pounds, valued at $328.37; eels, 11,639 pounds, valued at $938.58; sunfish, 2,568 pounds, valued at $228.86; suckers, 32,404 pounds, valued at $1,906.84; carp, 11,249 pounds, valued at $572.85; frostfish, 90,685 pounds, valued at $5,441.

Chaumont Bay.— Chaumont Bay, defined in the Conservation Law as that part of Lake Ontario in the county of Jefferson, lying between Horse Island and the town line of Lyme and Cape Vincent, yielded 219,739 pounds of fish. For this catch, the fishermen reported receiving $27,996.21, an average of over twelve cents per pound.

In 1924, the section of the Conservation Law regulating netting in the waters was amended so as to embrace more territory. Chaumont Bay, as now defined in section 278 of the Conservation Law, takes in all that water lying between Horse Island and Tibbits Light, in the county of Jefferson, except Mud Bay and Black River Bay.

There is no net fishing carried on in Chaumont Bay during the months of June, July, August and September. During the remaining months of the year, nets may be operated any distance from shore, the provision of law prohibiting the operation of nets within one-half mile of the shore in Lake Ontario not applying. Here good catches of eels, suckers, bullheads and other fish that frequent shore waters are taken. Last year there were taken 40,528 pounds of bullheads, 16,849 pounds of eels and 45,466 pounds of suckers.

Other species of fish and the amounts taken were: Ciscoes, 22,681 pounds; pike perch, 24,478 pounds; pickerel, 19,512 pounds; whitefish, 25,034 pounds; lake trout, 1,999 pounds; carp, 4,969 pounds; great northern pike, 11,952 pounds; sunfish, 4,830 pounds; sturgeon, 1,441 pounds.

The catch of fish in Chaumont Bay during 1923 exceeded the previous year by 17,599 pounds. With Chaumont Bay now embracing a much larger territory, it is expected that the catch of fish in these waters this year will be at least 100 per cent larger than the catch of 1923.

Great Sodus and Little Sodus Bay.— In Great Sodus Bay and in Little Sodus Bay on Lake Ontario netting is permitted with fykes and traps only from November 1 to December 3, for the taking of carp, dogfish, suckers, eels and ciscoes only. During this short period, in this restricted area, as many ciscoes are some years taken as are caught from Lake Ontario proper. In Great Sodus Bay last year, there were 39 nets in operation, and in Little Sodus Bay (Fair Haven Bay), there were 46 nets in operation, and in these nets were taken 40,997 pounds of ciscoes. These ciscoes, when sold, brought $3,005. Other fish taken included 141 pounds of eels, 415 pounds of carp and 24 pounds of suckers. The value of the catch of fish of all kinds was $3,062.09.

Looking up Lake George, Ship Island and Flora Island.

It is from the ciscoes taken from the waters of Sodus Bay that the Commission obtains many of the eggs used in its hatchery at Dunkirk.

Port Bay.— In Port Bay on Lake Ontario, the Commission licenses traps and fyke nets in the taking of carp, mullet, catfish, dogfish, bullheads, eels and suckers from October 16 to November 16, both inclusive. During 1923 there were licensed for operation in this body of water, 20 traps and one fyke, which devices, it is reported by the operators thereof, took 10,351 pounds of fish and received therefor in the fish markets $1,695.55, an average of about 16 cents per pound. The species of fish contributing most to the yearly catch in Port Bay is the bullhead. There were 8,431 pounds of bullheads taken last year, for which the fishermen received $1,313.28.

Eel Weirs and Eel Pots.— Very little is known of the breeding habits of eels, and where they spawn is a mystery. It is commonly believed that they spawn in the sea. They ascend the streams each spring, the young coming in countless numbers. That they travel over land is believed, owing to their presence in land-locked waters.

The eels are taken in greatest numbers when descending the streams in the fall. The method of capture is by eel weirs and eel pots. During 1923, the Commission licensed 411 eel pots and 36 eel weirs. These devices took 58,840 pounds of eels, which brought in the markets $7,686.37.

From the sale of licenses for eel pots and eel weirs, the Commission received $824.50.

Sturgeon Lines.— During 1923, the Commission licensed 148 bait and trap lines for the taking of sturgeon. Lines exceeding 1,200 feet in length are not licensed for use. The bait lines are equipped with 8–0 hooks set not less than two feet apart, baited with fish or other allurement, the sturgeon being taken in the same manner as fish are taken on an angling line. Trap lines are equipped with No. 10–0 hooks, set not less than six inches apart and anchored not more than three feet from the bottom. On trap lines the hooks are not baited. The lines are usually run along the bottom in shoal water where the fish feed. The sturgeon, once hooked, in an effort to get free, rolls about the bottom, and the more it rolls the more entangled it becomes in the hooks. When the fish is landed the hooks often have become so embedded in its flesh as to make cutting them out necessary.

A vacation home in the forest preserve.

The trap line is a device that should be prohibited in the taking of sturgeon. It is a cruel and vicious method, and one that will surely within a short time result in diminishing the fish to a point where the seasons for taking will have to be shortened or closed entirely to save the species. The most faulty thing about the device is that if undersized sturgeon are hooked, they are usually so mutilated they cannot be saved and die when liberated. Many undersized sturgeon are each year hooked that have never had an opportunity to reproduce themselves.

A few years ago, sturgeon were so scarce in Lake Erie that a law was passed prohibiting the taking of these fish before January 1, 1925. The law becoming effective was contingent upon the Dominion of Canada adopting an order in council prohibiting the taking of sturgeon in the part of the lake under its jurisdiction. This order the Dominion never passed, so the taking of sturgeon is allowed at all times. Consequently, sturgeon are less plentiful today in Lake Erie than they were when the law, which sought to prohibit their taking until 1925, was enacted. It would, therefore, seem a step would be taken toward the giving of sturgeon further protection, if the use of trap lines was prohibited.

On the 148 sturgeon lines licensed by the Commission in 1923, there were 29,082 pounds of sturgeon taken. For this catch, the holders of these licenses reported they received $13,435.17, an average of about 46 cents per pound. The price of license to operate a sturgeon line is $5.

Game Taken in Four Years

In order that there might be a more accurate record of game taken than it is possible to obtain through estimates, the Commission four years ago inaugurated a system whereby this information is obtained directly from the hunters and trappers themselves. Applicants for hunting and trapping licenses are required to note on the stub of the license, when taken out, a record of the game taken by them the preceding year. A printed list of the different kinds of game and fur bearing animals is printed on the stub of each hunting license and the hunter fills in the number of each species taken by him during the preceding year. These stubs are turned back to the county, city and town clerks at the end of the year and are forwarded to the Conservation Commission where their contents are tabulated. While allowance must be made for game killed by farmers on their own land and animals trapped by boys under sixteen who are not required to take out licenses, which might swell the total by approximately twenty per cent, this record is of value as showing the relative take from year to year and determining whether or not any species is in danger of extermination.

The total of game of all kinds taken in 1922 shows an increase of 75,300 pieces over the preceding year and is the largest since the present system of collecting information was adopted, the total amount of game taken being 1,752,144 pieces as compared with 1,676,844 pieces taken in 1921. Of thirty-four varieties of game, increases were shown on ten and decreases on twenty-four, the total increases being 154,203 and the total decreases 78,903. The largest increase was in cottontail rabbits, 55,357. The increase in the take of cottontails has been steady for the past five years, with the exception of 1920, which showed a considerable falling off from the preceding year. The next largest increase, 52,159, was on grey squirrels, the take of which in 1921 was 30,000 less than during the preceding year. The 1922 take was the largest in five years. The greatest decrease was in skunks, 44,257, the total take for the year being 110,770 as compared with 155,027 in 1921. With the exception of 1919, the take of skunks has been declining steadily since 1918. Nineteen hundred and nineteen was an exceptionally favorable season for all kinds of game and the take that year was 213,085, dropping to 149,891 in 1920 and recovering to 155,027 in 1921. The 1922 decline is the most marked of any and appears to indicate that skunks are being over-trapped. Muskrats, which have been pretty steadily declining for five years, show a small further decline in 1922. In 1919, the take was over 90,000 smaller than in 1918. There was a further decline of 50,000 in 1920 and a considerable recovery in 1921 which was only partially offset by the 1922 decline.

The number of deer taken in 1922 was 130 less than in 1921, which in turn was 1,226 more than in 1920, which was 3,849 less than in 1919 when the law permitted the taking of either bucks or does. The small take in 1920 undoubtedly resulted from the very heavy take in 1919 and the killing of so many does. The figures since that time appear to indicate about the limit of what the deer herd will stand. Reports from some sections in the Adirondacks are to the effect that deer in that part of the State are decreasing in numbers, but reports from other sections of the State show increases in localities where deer have not been common heretofore.

The take of pheasants and grouse shows a remarkably steady increase for the whole five years for which a record has been kept. The take of grouse in 1918 was small, 41,757. There was a slight increase the following year to 48,711, a much larger increase in 1920 when 83,141 were reported. In 1921 the total was 104,865 and in 1922 the total take reported was 125,554, which would appear to indicate that the grouse which a few years ago appeared to be in danger of extermination have succeeded in re-establishing themselves. The increase in pheasants has continued steadily from year to year, starting at 35,855 in 1918 and increasing to 46,249 in 1919, to 62,115 in 1920, 77;381 in 1921 and 94,547 in 1922, each succeeding year's increase being larger than the preceding year.

Practically all of the migratory birds and most of the fur bearing animals show decreases as will be seen from the following tabulation.

COMPARISON OF GAME TAKEN IN 1919–1920–1921–1922

Game	1919	1920	1921	1922
Cottontail rabbits.........	562,736	508,252	626,005	681,362
Muskrats	307,724	154,024	192,348	190,011
Skunks	213,085	149,881	155,027	110,770
Ducks	167,539	152,796	180,721	172,870

Game	1919	1920	1921	1922
Grey squirrels	136,125	162,035	132,839	184,998
Grouse or partridge	48,711	83,141	104,865	125,554
Pheasants	46,249	62,115	77,381	94,547
Snowshoe rabbits	28,805	43,683	46,986	43,290
Woodcock	27,836	25,723	23,870	21,894
Raccoons	18,321	14,610	19,517	18,430
Jack rabbits	17,379	20,648	21,147	23,758
Red foxes	14,653	11,043	12,410	12,019
Fox squirrels	11,699	9,396	7,529	5,863
Black squirrels	10,997	13,010	11,067	16,774
Greater yellowlegs	11,501	5,047	5,588	4,249
Wilson or jacksnipe	10,765	8,548	9,847	6,892
Quail	10,645	5,767	6,078	5,474
Mink	9,855	6,651	11,255	9,265
Deer (bucks)	8,470	7,839	9,065	8,935
Deer (does)	3,444	....	....	....
Coots	3,762	4,167	4,876	2,991
Grey foxes	2,947	2,464	2,576	2,262
Rails	2,191	1,727	2,734	1,343
Lesser yellowlegs	1,983	5,849	4,145	2,684
Black-bellied plover	1,729	1,806	1,424	783
Geese	1,400	2,726	3,276	1,785
Golden plover	1,337	1,943	1,273	641
Gallinules	1,265	516	551	271
Opossum	848	375	597	672
Bobcats	697	338	226	166
Sable or marten	393	123	186	187
Fishers	353	132	186	563
Bears	324	232	161	222
Otters	258	126	221	114
Brant	194	651	867	505
	1,686,219	1,017,387	1,676,844	1,752,144

Bureau of Marine Fisheries

During the year 12 franchises and 9 leases were assigned back to the State, covering 1,920 acres of shellfish ground. During this period 5 new leases were granted, covering 206.1 acres. At the close of this report there are 464 old perpetual franchises in force, covering 10,343.2 acres, also 120 leases, covering 4,425 acres, making a total of 14,768.2 acres of shellfish ground under cultivation in this State.

There are 49 Sanitary Certificates issued, covering 2,496.7 acres, setting forth that the shellfish from the grounds so mentioned were fit for use as food. These shellfish grounds so covered by Sanitary Certificates are located in nearly all parts of the waters of the marine district, namely, Long Island Sound, Raritan Bay. Hempstead Bay and Harbor, Great South Bay, Great and Little Peconic Bays, Shelter Island Sound, Oyster Bay, Huntington Bay, Cold Spring Harbor and in many of the other numerous bays, creeks and harbors. Sixty-two non-resident lobster licenses and thirty-seven non-resident food fishing licenses were issued. Twenty licenses were granted to steam vessels for the taking of Menhaden in our waters, rendering the same into oil and fertilizer. Six appli-

Lake George. Uncas Island on the left, Phantom Island on the right, French Point Mountain in the background.

cations for shellfish grounds were filed and six applications were granted. Fifty-three recordings were made and one relocation survey.

The State boat "Rednav" was in continuous service throughout the entire season, weather permitting, doing service in the entire marine district.

Initial surveys were made in Long Island Sound, near Oyster Bay, and Lloyds Neck and also in Raritan Bay.

Relocation surveys were made at Oak Neck, Lloyd's Neck and Raritan Bay. Inspections of the survey towers and monuments used in the survey of shellfish lands have been regularly made and it has been found that due to storms and other causes, it will be necessary during the coming year to replace over the monuments such towers as have been destroyed, the most important of which is the forty-foot tower at station "Lloyd's Point."

Regular inspections, made in cooperation with the Bureau of Chemistry of the U. S. Department of Agriculture, were made throughout the shellfish-growing area and specimen of shellfish taken were analyzed to determine the purity of the shellfish.

Owing to the necessity for frequent repairs to the small dory used in connection with the survey work, some of the surveys are held in abeyance until permanent repairs can be made.

Maps showing the new areas leased and also the areas surrendered to the State, have been prepared and are open for inspection to the shellfish cultivators at all times.

Bureau of Fish Culture

The year 1924 has been the most successful in the history of fish culture in the State of New York as regards output. A total of 1,213,831,863 food and game fish has been distributed from the hatcheries of the Commission, and there have been fewer losses through hatchery diseases than in recent years. With the exception of the trout at one station, the stock at the various hatcheries has been less subject to disease, and this is accounted for by a scrupulous attention to the cleanliness of troughs and to every article with which the young fish come into contact during the period of cultivation. From the 10,000,000 brook trout eggs at the disposal of the Commission for cultivation to the fry and fingerling stage, 8,004,908 fish were raised and planted in public waters of the State.

The increasing demand for trout fry and fingerlings by sportsmen in all parts of the State has led to a shortage in the stock at the hatcheries. In other years it has been possible to fill applications for trout which were received long after the time set for the close of their reception. This year, however, it has been necessary to notify such applicants that their requests must be held over for the distribution of next year. In this connection, it is well to caution applicants for fish to see that their requests are in the hands of the Commission before the time expires for their reception — February 1st for trout of all kinds and March 1st for maskalonge, pike perch, yellow perch and black bass.

By complying with this rule, the work of the Commission would not only be facilitated but citizens could be assured of being supplied with young fish during the next distribution season. Many delay sending in applications in the hope of receiving larger fish or "left overs," but, judging from the increase in requests there will be no "left overs" in the future.

Blue Crabs.— Requests from citizens residing on the shores of Long Island prompted the Commission to secure and plant 297,500,000 fry and 60 two-year-old blue crabs. This collection of eggs was also influenced by the growing scarcity of blue crabs in localities which, in other years, had been plentifully productive of the species. It is the intention of the Commission to continue planting the blue crab in the hope that an abundance may result.

The difficulties attending this initial taking of blue crab eggs after a number of years' cessation of efforts in that direction may be gauged by the following paragraph from a letter of Foreman Stanley C. Walters of the Commission's fish hatchery at Cold Spring Harbor, Long Island:

"The blue crab work was very discouraging on the start as I was unable to stay right there with the fishermen. The egg-crabs are only caught in pound and fyke nets, very few being caught by crab fishermen. Consequently they are dipped from the nets along with the fish and dumped into the bottom of the boat. As there is always water in the boat which is thickly mixed with fish-slime, the crabs will die in a very short time. This was my chief trouble as the crabs were coming ashore dead. I finally procured the services of a young fellow, owning a small boat, who collected the crabs from the fishermen and held them in the car until I could distribute them. The nets are all set offshore in the channels, as there is nothing to be caught inshore at this season (August), and, though not so many crabs are caught, what they do catch are very large, some weighing nearly one-half pound while others are heavier."

Arrangements will be made for the next taking of blue crabs, so that the same troubles will not be experienced and a greater supply of eggs secured.

The Fisheries Service Bulletin of the United States Department of Commerce, in the issue of September 1, 1924, has this to say as to the blue crab of Chesapeake Bay:

"The blue crab of Chesapeake Bay has become depleted to such an extent that fishermen and men in the industry are becoming greatly alarmed. Despite the great increase in price of crabs, which at present amounts to $1.50 to $2.00 per dozen as against 50 cents per dozen some years ago, the fishermen find it impossible, with the present scarcity of crabs, to make a living at fishing.

"At the urgent solicitation of a delegation of men in the crab business, the Bureau of Fisheries has seen fit to institute an investigation of this fishery, which should bring forth information of more recent date than that furnished by the investigation of 1920 and accurately show the present condition of the fishery, thus enabling the bureau to make recommendations for the protection of this valuable crab in the Chesapeake Bay. R. H. Fiedler was detailed to this duty and will work in Maryland and Virginia procuring the necessary data.''

Black Bass.— The comparatively small output of black bass by the hatcheries of the Commission is accounted for in the explanation that this species of game fish will not permit of artificial handling for the removal of spawn. The trouts, pikes and perches distributed by the Conservation Commission are all ''stripped'' of spawn by fish culturists either in the hatchery or at the water from which the fish are taken; but the reproduction of black bass must be left to natural courses which necessitates the construction of ponds especially adapted to nest building for the bass. This, the only method of bass cultivation, makes for a limited supply of fry for the hatcheries, and brings up the question of the best means of conserving one of the greatest game fishes of our waters.

It is known that the spawning season of the black bass is not uniform. At present, the general open season for the taking of black bass occurs on June 16th. It is reasonable to believe that in a great number of waters of the State, the spawning season has ended by that date; but in some waters it is certain that it continues each year until after July 1st, and many times, because of delayed seasons or for other causes the spawning of the bass continues until July 16th.

When the bass season opens before the spawning season is ended, the fish on their nests are an easy prey to the thoughtless or unscrupulous angler. They are easily taken and the hatched brood or the eggs on the nest are lost to the waters. The protection of one bass nest on a lake or stream would mean far more in stocking the water than the entire allotment of a season by the Conservation Commission handicapped by the only known method of cultivation —that of pond culture.

The male parent bass guards the nest during the time of egg hatching and until the resultant swarms of bass fry are able to care for themselves. Without the care of the parent bass the eggs in the nest invariably die and without his guardianship the swarm of fry would be at the mercy of every natural enemy and soon destroyed.

The average output of one bass nest protected would be 2,500 fry, and the probable largest stocking of the water by the State Fish Hatchery would be 500 fry—one fifth of nature's distribution. The only way to insure the permanence of the bass is to protect them on their spawning beds, and the best way to do that is to extend the close season for their taking until July 1st. When sportmen are assured that, unless the bass have a close season which will be absolutely inclusive of their spawning time in all the waters of the State, the passing of this game species will become evident, they will join heartily in the plea for legislation which will give this great and distinctively American game fish the protection it deserves.

Pikeperch.—The distribution of pikeperch from the Oneida Hatchery, at Constantia on Oneida Lake, was the largest in years. Of 122,850,000 pikeperch fry distributed, 120,740,000 came from Oneida Lake. These young fish are planted as fry during the month of May, 50,000 being carried in the ordinary 40 quart container or milk can in use for transportation purposes. No attempt is made to cultivate pikeperch to the fingerling state because of their cannibalistic habits. They must be distributed at once or they will work more havoc amongst themselves in a confined space than a general average of their combined natural enemies would in open waters.

The pikeperch is a delicious table fish and its game qualities endear it to the angler. When hatched a very large percentage of pikeperch are returned to Oneida Lake, and, as a result, instead of taking this valuable fish from the lake to the detriment of the supply, it is estimated that a very large percentage of the fry grow to maturity whereas but 5 per cent would mature if left to natural courses.

Oneida Lake has been the principal source of pikeperch supply for the State; but it is significant that owing to the consistent planting of fry it continues to maintain its reputation as one of the best pikeperch fishing grounds in the United States.

DAN E. MILLER

Dan E. Miller for 12 years foreman of the Oneida Hatchery of the Commission at Constantia, on Oneida Lake, died on June 10th.

Mr. Miller was a tireless worker and gave to his tasks both earnestness and energy. He was absorbed in his fish cultural work and enthusiastic in its accomplishment. Mr. Miller was essentially individual and left his impress on fish cultural conservation in New York.

Courtesies.—The Bureau of Fish Culture desires to again express appreciation of the valuable cooperation of the railroads of the State in furnishing free transportation for messengers when engaged in delivering fish and eggs. This cooperative spirit is encouraging to the Commission and enables the Bureau to expend in additional stock money which would otherwise go for fares, baggage and other incidentals of travel.

The Commission expresses thanks to the United States Commissioner of Fisheries for shipments of lake trout and steelhead trout eggs which were developed at the Caledonia Hatchery and planted in suitable waters.

Private Cultivation of Trout.—The cost of raising rainbow and brook trout fry to the fingerling stage varies greatly with the facilities at hand for cultivation, and the amount of care bestowed. Many game clubs throughout the State have attempted to raise the fry to a length of from 4 to 6 inches, but the loss in young fish through lack of the constant care which is given to them at the regular stations of the Conservation Commission — to say nothing of disease encountered and the lack of facilities with which to fight it — has contributed to make the experiments. in most cases, far from successful. Of course, this intensive cultivation of fish may be carried on by a large organization which would employ a competent fish culturist and skilled assistants, as is done by two large fish and game associations in Central New York; but all sizes of trout up to 5 inches in length are distributed by this Commission, and if applicants would designate the time of the year up to the first of October in which they would care to have fingerling trout delivered, the Commission would endeavor to set aside a supply and deliver them at a time when the trout had reached the stage of development preferred, and this would be when they were perfectly well able to take care of themselves — saving both trouble and expense. The fish would be properly and regularly fed up to the date of delivery and the recipient would be sure that the fish received would be the survival of the fittest. To guarantee even a measure of success with trout raising, it would be necessary that the young fish have constant care, with some skilled person responsible for their feeding all of the time. The proper selection and cost of food should not be heavy or troublesome as compared with other cares in the successful development of young trout.

The majority of ichthyologists agree that, in the distribution of fingerling trout, the best sizes for planting is from 2 to 2½ inches and this is the development at which the greater part of the Commission's fingerlings are distributed. In that development the young fish have learned to care for themselves without becoming so tame as to lose their fear of humanity, which sometimes happens when fish are constantly fed by hand. Hatchery bred trout of a larger size are more likely to become easy victims of the small boy and of natural enemies.

Adirondack Hatchery.—The work at this station for the fiscal year ending June 30, 1924, has been very successful. The usual species of fish have been propagated.

Seven hundred and eighty-two thousand maskalonge eggs were hatched and distributed as fry to the St. Lawrence River and Lake Champlain Districts. These maskalonge eggs were shipped from the Chautauqua Hatchery.

Since July 1, 1923, 2,042,043 brook trout fry and fingerlings have been shipped from this station to various water of the State Enough brook trout fingerlings were sent to the Chateaugay Field Station of the Commission at Chateaugay, N. Y. to stock the waters of the vicinity. Ninety-seven thousand eight hundred and seventy-five brook trout fingerlings were exchanged for an equal number of lake trout fingerlings with Mr. William Commerford, a commercial fish culturist of Boonville, N. Y. Eighty-three thousand eight hundred lake trout fingerlings; 39,400 rainbow trout fingerlings and

6,662,000 whitefish fry have been distributed from this station during the fiscal year. Up to the present time no lake trout, rainbow trout or landlocked salmon of this year's stock have been shipped, as they are being held for later distribution.

No important repair work was done during the past year except painting the buildings which was done during the fall.

A trip by the foreman of this station to the Caughnawaga Club in Northwestern Quebec, Canada, to collect wild brook trout eggs from Blue Lake furnished him with much interesting experience. The spawning season of the brook trout in Blue Lake and adjacent waters occurs much later than does that of the Adirondack brook trout, no eggs being taken in Blue Lake until November 2nd. At the end of two weeks the fish had practically finished spawning. The Indian Guides assert that usually the trout do not spawn until after the lakes freeze over. The Club is thirty-two miles from a railroad and as the greater part of the route is by water, the late spawning season makes it a difficult matter to get spawn from the beds to a point of shipping. An unusual fact noted was the absence of any small brook trout taken in the nets; no brook trout less than one-half pound in weight was caught, and from that the weight ranged up to four or five pounds. The brook trout taken on this preserve were much more highly colored than Adirondack brook trout, and are very similar to the Adirondack trout, caught years ago, which had the undershot jaw. These trout have practically disappeared from our waters. The principal food of the fish in the Lake is freshwater shrimp, which abounds in great numbers. A little minnow, about one and one-half inches long, having a reddish brown stripe on the sides, is also eaten. This is unlike any of our Adirondack minnows. The fish hatched from the eggs collected in Canada are fine, healthy specimens, and will certainly help fishing in waters to which they are introduced. Because of its isolation and inaccessibility it is an expensive trip and, from a financial point of view, not practicable, but from the fish culturist's point of view, it is most interesting and instructive. The trip was made possible through the cooperation of the Conservation Commisison with Mr. J. B. Marvin, Jr. of Upper St. Regis Lake, a man deeply interested in the welfare of the Adirondacks, who financed the expedition and secured a permit from the Caughnawaga Club and also from the Canadian government to allow the taking of the eggs.

Bath Hatchery.—The end of the fiscal year found an increase in the distribution of trout by this station over that of previous years.

Applicants were prompt in meeting shipments of fish, and letters have been received at the station complimenting the foreman on the excellent condition in which fish were delivered.

During the year the hatchery buildings were painted. New covers were made for the races and five hundred and seventy-five feet of eight inch pipe was laid from the fountain to the hatchery.

The grounds have been provided with picnic tables and seats. This has proved popular with tourists and picnic parties who make use of them frequently.

Caledonia Hatchery.— The fish cultural operations at the Caledonia Hatchery during the past year have been very satisfactory.

The output of fingerling brown trout will show a substantial increase. About 400,000 more of the eggs of this species were taken from our stock fish than in any previous year — the total number of eggs taken being 1,760,998. Of this number 350,000 eyed eggs were shipped to other hatcheries of the Commission. The balance were hatched at this station. The fish are now at the fingerling stage and all applicants who have received them are well pleased. The usual number of rainbow trout eggs were taken. The hatched fish are now healthy, and promise enough to fill all applications. The stock fish are in good condition and there should be a good supply of brown and rainbow trout eggs.

Six hundred thousand brook trout eggs were raised to the fingerling stage and the greater part of them shipped to local waters. Two hundred thousand were sent to the Summitville Field Station.

One hundred thousand steelhead trout eggs were received from the United States Bureau of Fisheries Station at Medford, Oregon, and the fry are now feeding. They will be kept to fingerling size before shipment.

Twenty-four million pikeperch eggs were received from the Oneida Hatchery of this Commission and the resulting fry were planted in waters in the western part of the State.

The lake trout fingerlings are in very good condition and will be held until later in the season.

The hatchery buildings were painted last fall, and the dwelling house will be painted during the summer.

Repairs are needed to some of the stone walls. They should be replaced by concrete. Some grading has been done in an effort to make more room in which to park cars, but a great deal more space is needed before there will be sufficient room, as each year more people visit the hatchery.

Chautauqua Hatchery.— The output of fry and fingerling trout at this station will not equal that of last year due to diminished water supply in the case of the brook trout and extremely low water temperature during the maskalonge spawning season. The number of brook trout eggs cultivated this year was only 400,000 whereas last year the hatchery was able to care for 600,000.

The water temperature during the maskalonge spawning season ranged from 45 degrees to 53 degrees F. The usual range is from 50 to 60 degrees F. The total number of eggs taken was 10,560,000 from which a hatch of 73.43 per cent, or 7,755,000, was obtained, including the 880,000 eyed eggs sent to the Adirondack Hatchery. The Chautauqua Hatchery shipped 1,425,000 maskalonge fry to applicants and planted 5,450,000 in Chautauqua Lake. Due to increased facilities, the hatchery was enabled to produce better fry than last year. Practically all of the fry distributed were held in new boxes for from 4 to 6 days and would have started feeding in a few days. At the end of the season about 50,000 were held until they were swimming up and searching for food. The fry planted in Chautauqua Lake were well distributed along the shore for about 25 miles.

The brook trout work was carried on in the usual manner with small loss. The total number distributed up to June 30th was 299,450 with about 70,000 on hand.

During September various species of fish were sent to the Dunkirk, Hamburg and New York State Fairs and to the Rochester Exposition. The fish exhibit here last summer gave visitors much pleasure and seems to be looked forward to as an annual event.

After completion of trout distribution last year, all buildings were painted and interiors varnished except the foreman's residence which should have attention this season. Concrete walks were replaced where necessary and a loading platform built. It is suggested that a large pond be constructed on the land now owned by the State for experiments with rearing maskalonge to fingerling size.

Cold Spring Harbor Hatchery.—Aside from the regular routine work and the distribution of fish, some much-needed repairs were made at this station during the months of August, September and October. These repairs included a new floor in the hatching room which was made imperative by the hatching apparatus sinking through the old floor, also the repairing of the battery which was installed in 1920. This was lengthened to accommodate more jars. A new battery was constructed in the north end of the hatching room and a combination hatching and fry retaining table was also made. These additions to the hatching equipment have increased the number of jars to almost double the previous capacity. A Gould centrifugal pump driven by a 5 H. P. electric motor was installed to supply the batteries with sufficient water; a gasoline engine and pump, from the abandoned Montauk Hatchery, were put in as emergency power in case the electric current fails. As the hatching season is in the winter and spring, ice storms and heavy gales often cause the power to be off for several hours, during which times dependence has to be placed on a gasoline engine 8 or 9 years old, and this emergency equipment is entirely inadequate for the important part it plays at a critical time.

St. John's Lake, which adjoins the hatchery grounds, changed ownership during the past season and the new owners courteously offered the surplus water for use at this station.

The latter part of October the work of installing an 8-inch main from the lake to the hatchery was started and by the middle of December the hatchery was in operation. The additional supply of water filled a long-felt need at this station.

The tomcod season was a very successful one, especially with the new equipment. More hatching jars could be operated with a larger flow of water to each jar.

The flatfish work was impeded on the start owing to heavy gales which drowned the fish in the nets, making them useless for spawn-taking; but as better weather conditions prevailed later, a large collection of eggs was made.

The run of smelt up the Hatchery creek was the largest ever known and a fine collection of eggs was made, every jar being filled to capacity and the spawning fish still continued to run up the creek at least two weeks after fishing had been discontinued.

All the three species mentioned above were hatched into strong vigorous fry and distributed to the various bays, harbors and inlets of Long Island. Smelt fry were shipped to Lake Champlain, Skaneateles and various lakes in Westchester county.

The distribution of trout started the first of May and continued until the end of the summer.

Delaware Hatchery.— This hatchery reports the conclusion of a successful season.

The brown trout eggs received from Caledonia were good.

No rainbow trout eggs were cultivated this year.

All applicants receiving fish from this hatchery were well satisfied with the size and condition of the fish when received.

Repairs were made to raceway covers and new cleats put in along on the sides in the bottom of each one so that no trouble has been experienced like that of last season in fish getting away. The head trough and races need building over before another season. They are badly rotten and past repairing. The barn has been painted. Repairs should be made to both the dams in the brook by laying new boards on the spillways.

The water supply has been good and the fish have done well.

Dunkirk Hatchery.— The work at this station during the last fiscal year was confined to the propagation of herring. It was very successfully carried on. The percentage of hatch was not as great as the year before, but notwithstanding, was very good; 75,153,000 green herring eggs were received from Sodus Bay and 23,712,000 were taken from Lake Erie. Out of these eggs were hatched 85,656,000 fry; 56,706,000 fry were planted in Lake Erie and 28,700,000 were taken to Sodus Bay and planted there.

There should be a new water supply tank put in the hatchery this year as the present one is in very bad condition. One of the pumps should be replaced by a new one. The old pump has been used so much that it is almost at the end of its usefulness.

The shrubs that were planted here have done very well and visitors comment favorably on their appearance.

Fulton Chain Hatchery.— The work at this station has been carried on in the usual manner during the past year with good success.

More fingerling trout and less fry were shipped from here during 1924 than in the preceding year. The greater part of the shipments were made by truck.

Last season's collection of whitefish eggs was not as large as usual, but the eggs taken were in fine condition and a very good hatch was obtained.

Only repairs absolutely necessary were made at the station during the past year. A new dam across the creek in the woods should be erected and rearing troughs and races should be built and repaired if the place is to be used again. The nets, which we started to make in 1923, were finished and effectively used last season. Others will be ready when the fish are distributed. No painting was done during the last fiscal year but this year it is expected that the foreman's cottage will have attention.

Oneida Hatchery.— The months of July, August and September, 1923, were employed in cleaning bass ponds and in collecting fish for exhibiting at State and County Fairs. Fish were furnished for the State Fair at Syracuse, for the Rochester Exposition and for the Erie County Fair, held in Hamburg, N. Y.

All applications for yellow perch fingerlings sent to this hatchery were filled.

The winter months were spent in painting troughs and portions of the hatchery, scraping and repainting boats and fish cans and repairing nets.

The spring high water did some damage to the bank of the creek but it also was the means of removing the fish rack which may have been disguised good fortune as the catch of pikeperch this spring was much larger than usual, a hatch of 85 per cent from a total of 135,600,000 eggs being obtained.

Shipping from this station is quite inconvenient on account of railroad service. The fish car Adirondack helped out considerably with the distribution of pikeperch this spring, although the loading had to be done at Central Square — a distance of eight miles from the hatchery. This station is badly in need of a new truck to help out in the shipping problem.

A backward season will be responsible for a falling off in the number of bass which it was planned to ship to suitable waters of the State; but it is believed that every application on file will have attention, even if it is necessary, because of the lack of stock, to cut some of the requests from the amount originally allotted. Up to July 1st, 141,000 bass fry were shipped and shipments will continue until the 10th of July owing to the large amount of territory to be covered.

St. Lawrence Hatchery.—The production of pikeperch at the St. Lawrence Hatchery was greatly decreased because of the cold weather condition prevailing at the time these fish were spawning. The supply of pikeperch eggs for this station is taken from the pikeperch running up the Oswegatchie river at Ogdensburg. This year, owing to the exceedingly low temperature, the pikeperch spawned in the deep water of the St. Lawrence river. With 210 cans of pikeperch from the Oneida Hatchery and 2,110,000 hatched at this station, all applications for pikeperch were filled.

The St. Lawrence Hatchery has had a very good season with smallmouth black bass. One hundred and forty-two thousand smallmouth black bass fry have been planted in public waters of northern New York, and there will be a large number of advanced fry and fingerlings planted during the months of July and August.

Summitville Hatchery.— During the month of March this field station was made ready for the reception of the trout fry which were being cultivated at other stations of the Commission — the hatchery at Linlithgo serving as the principal auxiliary to Summitville in the rearing of trout. The Caledonia Hatchery sent 210,000 brook trout fry and Linlithgo 941,000, making a total of 1,151,000 fry at the disposal of the hatchery for further development and distribution. This permitted the filling of all applications for brook trout assigned to this hatchery.

The present dam across the stream is inadequate for the needs of the hatchery and it is recommended that a concrete dam be built which would hold the water in times of drought. This dam could be built 200 feet above the hatchery troughs and could be connected with the troughs by a 10-inch pipe.

It is also recommended that an enclosed hatchery be built upon the property, to the end that trout eggs may be hatched there instead of at Linlithgo and other stations of the Commission. This would do away with the transfer of fry at a critical time. Sudden changes of water are not good for trout fry and a saving in expenses would result. It is also figured that trout eggs will hatch two months earlier at Summitville than at Linlithgo. The temperature of the water at Linlithgo is 32 degrees in winter while at Summitville, at the same time, the temperature ranges from 45 to 50 degrees. The highest point reached in summer at Summitville is 62 degrees.

Warrensburg Hatchery.— The trout eggs at this hatchery were exceptionally good this year, and about 1,550,000 fingerlings will be planted.

All of the hatchery buildings were painted last fall and are in good shape, except the window frames in the hatchery, which are rotted out and should be replaced by cypress frames.

There was no new construction work at the station.

Fish Distribution by Stations From January 1, 1924 to December 31, 1924

Adirondack	9,304,450
Bath	1,191,463
Caledonia	24,589,125
Chautauqua	7,252 380
Cold Spring Harbor	967,051,130
Delaware	1,091,300
Fulton Chain	13,687,915
Linlithgo	1,282,500
Oneida	98,208,400
St. Lawrence	2,314,800
Warrensburg	1,638,375
Dunkirk	85,656,000
Summitville	520,400
Chateaugay	43,625
	1,213,831,863

ADIRONDACK HATCHERY

Whitefish, fry	6,662,000
Landlocked salmon, fingerlings	16,380
Rainbow trout, fingerlings[1]	30,450
Lake trout, fingerlings	131,650
Brook trout, fry	174,000
Brook trout, fingerlings	1,507,970
Maskalonge, fry[2]	782,000
	9,304,450

BATH HATCHERY

Brown trout, fingerlings[3]	83,895
Brook trout, fingerlings	1,107,568
	1,191,463

CALEDONIA HATCHERY

Steelhead trout, fingerlings	55,600
Brown trout, fingerlings[4]	699,650
Rainbow trout, fingerlings[5]	281,675
Lake trout, fingerlings	190,950
Brook trout, fingerlings[6]	321,250
Pikeperch, fry[7]	23,040,000
	24,589,125

CHAUTAUQUA HATCHERY

Bullheads, adults	250
Brook trout, fingerlings	377,130
Maskalonge, fry[8]	6,875,000
	7,252,380

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[1] These fish were produced from eggs furnished by the Caledonia Hatchery.

[2] These fish were produced from eggs furnished by the Chautauqua Hatchery.

[3] These fish were produced from eggs furnished by the Caledonia Hatchery.

[4] 150,000 Brown Trout eggs were sent to the Bath Hatchery and 200,000 to the Delaware Hatchery for development and distribution.

[5] 50,000 Rainbow Trout eggs were sent to the Adirondack Hatchery for development and distribution.

[6] 210,000 Brook Trout, fry were sent to the Summitville Field Station for further development and distribution.

[7] The eggs, from which these fish were produced, were furnished by the Oneida Hatchery.

[8] Maskalonge eggs, from which were produced 782,000 fry, were sent to the Adironadck Hatchery.

COLD SPRING HARBOR HATCHERY

Brown trout, fingerlings	411,800
Rainbow trout, fingerlings	127,050
Rainbow trout, yearlings	5,770
Rainbow trout, adults	350
Brook trout, fingerlings	460,600
Brook trout, yearlings	1,500
Smelt, fry	245,544,000
Tomcod, fry	330,000,000
Flatfish, fry	93,000,000
Blue crab, fry	297,500,000
Blue crab, 2 year	60
	967,051,130

DELAWARE HATCHERY

Brown trout, fingerlings[9]	64,100
Brook trout, fry	404,500
Brook trout, fingerlings	622,700
	1,091,300

FULTON CHAIN HATCHERY

Whitefish, fry	12,855,000
Lake trout, fingerlings	6,125
Brook trout, adv. fry	125,000
Brook trout, fingerlings	701,790
	13,687,915

LINLITHGO HATCHERY

Shad, fry	1,282,500

941,100 brook trout, fry, were sent to the Summitville Field Station for further development and distribution.

ONEIDA HATCHERY

Buckeye shiner, fingerlings	10,000
Smallmouth bass, fry	141,650
Smallmouth bass, adv. fry	17,300
Smallmouth bass, fingerlings	21,700
Pikeperch, fry[10]	97,700,000
Yellowperch, fingerlings	317,750
	98,208,400

ST. LAWRENCE HATCHERY

Smallmouth bass, fry	142,000
Smallmouth bass, adv. fry	61,500
Smallmouth bass, fingerlings	1,300
Pikeperch, fry	2,110,000
	2,314,800

WARRENSBURG HATCHERY

Brook trout, fingerlings	1,638,375

DUNKIRK HATCHERY

Lake herring, fry	85,656,000

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[9] The eggs, from which these fish were produced, were furnished by the Caledonia Hatchery.

[10] Pikeperch eggs, from which were produced 23,040,000 fry, were sent to the Caledonia Hatcherhy.

SUMMITVILLE FIELD STATION

Brook trout, fingerlings[11]	520,400

CHATEAUGAY FIELD STATION

Brook trout, fingerlings[12]	43,625

Distribution of Fish by Species From January 1, 1924 to December 31, 1924

Bullhead, adults	250
Buckeye shiner, fingerlings	10,000
Shad, fry	1,282,500
Whitefish, fry	19,517,000
Lake herring, fry	85,656,000
Landlocked salmon, fingerlings	16,380
Steelhead trout, fingerlings	55,600
Brown trout, fingerlings	1,259,445
Rainbow trout, fingerlings	439,175
Rainbow trout, yearlings	5,770
Rainbow trout, adults	350
Lake trout, fingerlings	328,725
Brook trout, fry	578,500
Brook trout, adv. fry	125,000
Brook trout, fingerlings	7,301,408
Brook trout, yearlings	1,500
Smelt, fry	245,544,000
Maskalonge, fry	7,657,000
Smallmouth bass, fry	283,650
Smallmouth bass, adv. fry	78,800
Smallmouth bass, fingerlings	23,000
Pikeperch, fry	122,850,000
Yellow perch, fingerlings	317,750
Tomcod, fry	330,000,000
Flatfish, fry	93,000,000
Blue crab, fry	297,500,000
Blue crab, 2 year	60
	1,213,831,863

Fish Distribution by Stations 1920–1924

	1920	1921	1922	1923	1924
Adirondack	7,345,001	8,225,876	8,642,736	8,637,570	9,304,450
Bath	1,180,886	982,176	1,012,370	1,051,906	1,191,463
Caledonia	31,462,407	26,067,157	28,596,275	4,019,850	24,589,125
Chautauqua	4,991,210	4,212,240	6,605,250	7,926,295	7,252,380
Cold Spring Harbor	470,156,120	334,983,967	395,829,125	577,267,250	967,051,130
Delaware	631,460	817,860	1,240,758	880,250	1,091,300
Fulton Chain	16,950,996	16,226,564	16,746,125	19,802,547	13,687,915
Linlithgo	14,103,069	8,447,925	1,056,875	1,406,000	1,282,500
Oneida	32,330,700	13,892,651	69,160,100	43,035,912	98,208,400
St. Lawrence	13,323,547	16,991,000	17,455,000	3,427,600	2,314,800
Warrensburg	1,219,450	1,350,540	1,500,350	1,543,360	1,638,375
Dunkirk	141,238,000	125,474,000	160,664,000	94,482,000	85,656,000
Canal Ponds	38,420	7,690	193	....	....
Summitville	87,150	267,150	465,850	544,550	520,400
Chauteaugay	....	....	....	....	43,625
	735,058,416	557,856,796	708,975,007	764,025,090	1,213,831,863

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[11] 210,000 Brook Trout, fry were received from the Caledonia Hatchery.

[12] These fish were produced at the Adirondack Hatchery

DISTRIBUTION OF FISH BY SPECIES
From 1920–1924

	1920	1921	1922	1923	1924
Bullhead, fing	4,850	4,050	....	....	....
Bullhead, yr	1,850	....	....	....	....
Bullhead, adults	....	320	....	....	250
Buckeye shiner, fing	9,500	....	....	....	10,000
Shad, fry	1,776,279	703,125	1,056,875	1,406,000	1,282,500
Frostfish, fry	....	290,000	171,700	....	....
Whitefish, fry	32,123,000	47,504,000	25,596,000	44,886,000	19,517,000
Lake Herring, fry	151,250,000	118,110,000	178,360,000	75,268,000	85,656,000
Chinook salmon, fing	....	4,000	....	....	....
L. L. salmon, fry	....	....	1,880	....	....
L. L. salmon, fing	131,037	104,173	....	3,000	16,380
Steelhead trout, fing	466	118,000	37,500	32,950	55,600
Brown trout, fry	....	....	....	54,500	....
Brown trout, adv. fry	100,500	84,000	....	....	....
Brown trout, fing	478,666	515,405	1,108,125	995,500	1,259,445
Brown trout, yr	....	....	....	500	....
Brown trout, adults	3	13	8	....	....
Rainbow trout, fry	....	....	39,000	31,000	....
Rainbow trout, adv. fry	12,000	71,100	....	....	....
Rainbow trout, fing	417,582	450,520	525,948	557,425	439,175
Rainbow trout, yr	....	....	1,000	10,750	5,770
Rainbow trout, adults	7	19	25	235	350
Lake trout, fry	162,500	92,000	....	....	....
Lake trout, adv. fry	326,350	12,000	....	....	....
Lake trout, fing	1,217,655	767,655	553,615	514,697	328,725
Brook trout, fry	1,280,500	1,783,000	1,115,500	449,000	578,500
Brook trout, adv. fry	715,700	897,396	580,000	262,750	125,000
Brook trout, fing	4,179,234	4,175,342	5,905,538	7,323,583	7,301,408
Brook trout, yr	....	....	....	....	1,500
Brook trout, adults	....	32	....	....	....
Smelt, fry	105,801,000	85,440,000	....	98,000,000	245,544,000
Maskalonge, fry	5,421,720	3,990,000	6,575,000	8,075,000	7,657,000
Maskalonge, fing	187	....	....	....	....
Crappie, fing	300	....	....	....	....
Smallmouth bass, fry	250,000	150,900	159,800	405,000	283,650
Smallmouth bass, adv. fry	....	....	16,000	138,300	78,800
Smallmouth bass, fing	123,010	342,500	58,800	1,700	23,000
Smallmouth bass, yr	....	100	....	....	....
Largemouth bass, fing	15,270	3,540	....	....	....
Largemouth bass, yr	....	....	193	....	....
Pikeperch, fry	61,370,000	43,700,000	91,790,000	47,418,500	122,850,000
Yellow perch, fry	3,000,000	50,000	....	....	....
Yellow perch, fing	272,000	342,500	350,500	190,700	317,750
Tomcod, fry	276,081,250	171,000,000	223,000,000	325,000,000	330,000,000
Flatfish, fry	75,000,000	66,000,000	156,000,000	153,000,000	93,000,000
Lobster, fry	13,536,000	11,130,000	15,972,000	....	....
Blue crab, fry	....	....	....	....	297,500,000
Blue crab, 2 yr	....	....	....	....	60
Miscellaneous, fing	....	46	....	....	....
	735,058,416	557,856,796	708,975,007	764,025,090	1,213,831,863

DISEASES OF FISH

The work of the year has carried forward the studies of hatchery diseases and those of our public waters. Two diseases afflicting the skin of fry and fingerlings have been diagnosed and the source of origin indicated. Remedies therefor are known. These have been tested successfully and measures suggested for the further prevention of the maladies. Four diseases caused by parasitism of one or more of the internal organs have been diagnosed wholly or in part. Certain phases of the life history of the causal organisms remain to be elucidated before adequate measures of prevention may be considered and adopted.

The Commission has been represented by the Investigator in Fish Culture at two important meetings during the year, before each of which a paper was presented on the subject of fish diseases.

> The American Association for the Advancement of Science, Cincinnati, Ohio, December 28, 1923. The life history of *Octomitus salmonis*, an intestinal flagellate of trout.)
>
> The American Fisheries Society, Quebec, Canada, September 10, 1924. (The transmission of *Octomitus salmonis* in the egg.)

Introduction.— During the sixty odd years of fish culture a standardized technique has been developed for rearing and handling vast numbers of fish. Progress, however, in the development of physical equipment has quite outrun advancement of knowledge of the physical well-being of the output. The herding of fish in large numbers under the artificial conditions of a hatchery is attended often with serious setbacks. Infectious diseases of one sort or another occur which require prompt treatment to forestall an epidemic and consequent heavy losses.

To make this annual crop of young fish a less precarious one, the Conservation Commission places scientific research in fish diseases in the same category as insurance. That is, insurance against loss of countless numbers of the young by the various ills that fish are heir to.

Some of these diseases are goitre, contagious skin diseases, respiratory troubles, digestive disturbances, deficiency diseases, and on. They represent a formidable array of ills in many respects not unlike human ailments, yet, so far as we know, the germ of only one fish disease, a tapeworm (*Diphyllobothrium latum*), has been found to be transmissible to human beings. This, it should be stated, presumably has followed the consumption of uncooked fish.

While it is certain that a better understanding of such fish diseases would render the conquest of similar human ills more rapid, it is not from this viewpoint that intensive study has been organized and directed by the Conservation Commission. It is rather to promote the health of the fishes, and thus offset the annual losses that follow in the train of artificial propagation. Already a considerable number of serious epidemic diseases have been diagnosed and remedies prescribed or preventive measures adopted, but many are still baffling and require continued study of their natural history in order to discover the weak links in the chain of causation.

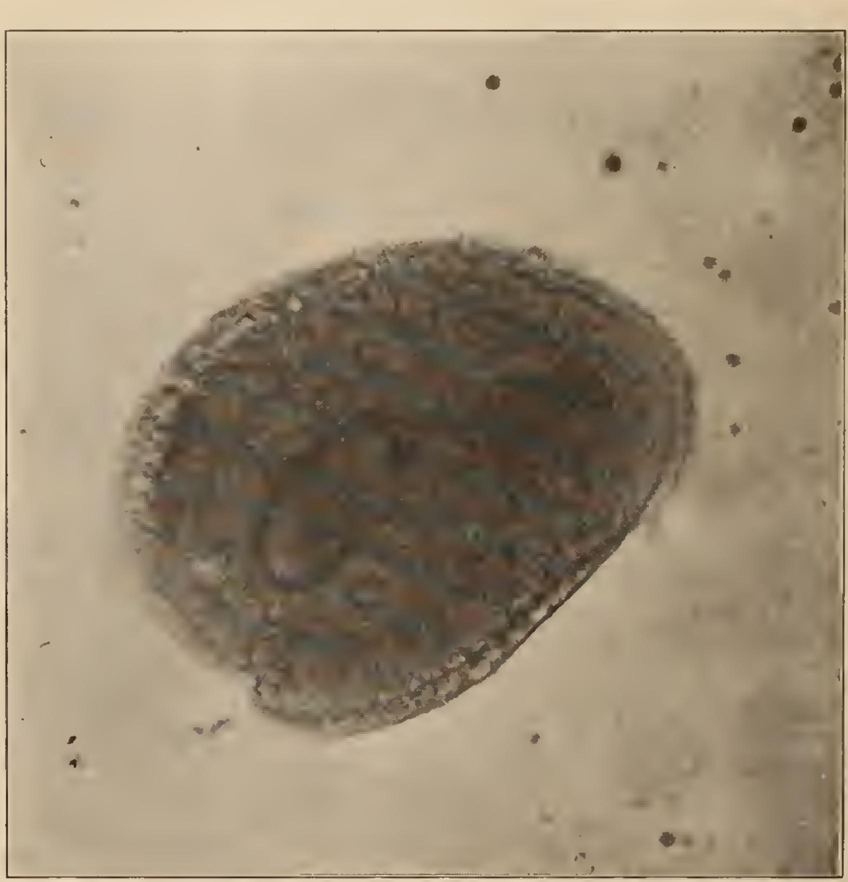

Fig. 1.— *Chilodon cyprini* Moroff. Adult parasite. From a water mount lightly stained. Magnification about 1200.

The business of keeping fish healthy rests obviously far more securely on prevention than on correct diagnosis and treatment. Many troubles in a hatchery arise without doubt out of the conditions of the environment. This is indicated by the fact that the diseases disappear altogether or become greatly attenuated when the fish are planted into natural waters. For this reason intensive studies in pathology should be augmented by experimental investigations along several lines which would promote the well-being of the fish and at the same time increase the efficiency of the hatchery. Such studies involve the careful investigation of over-crowding, the requirements of food and of oxygen, the freedom from carbon dioxide, and the adoption of adequate sanitary measures.

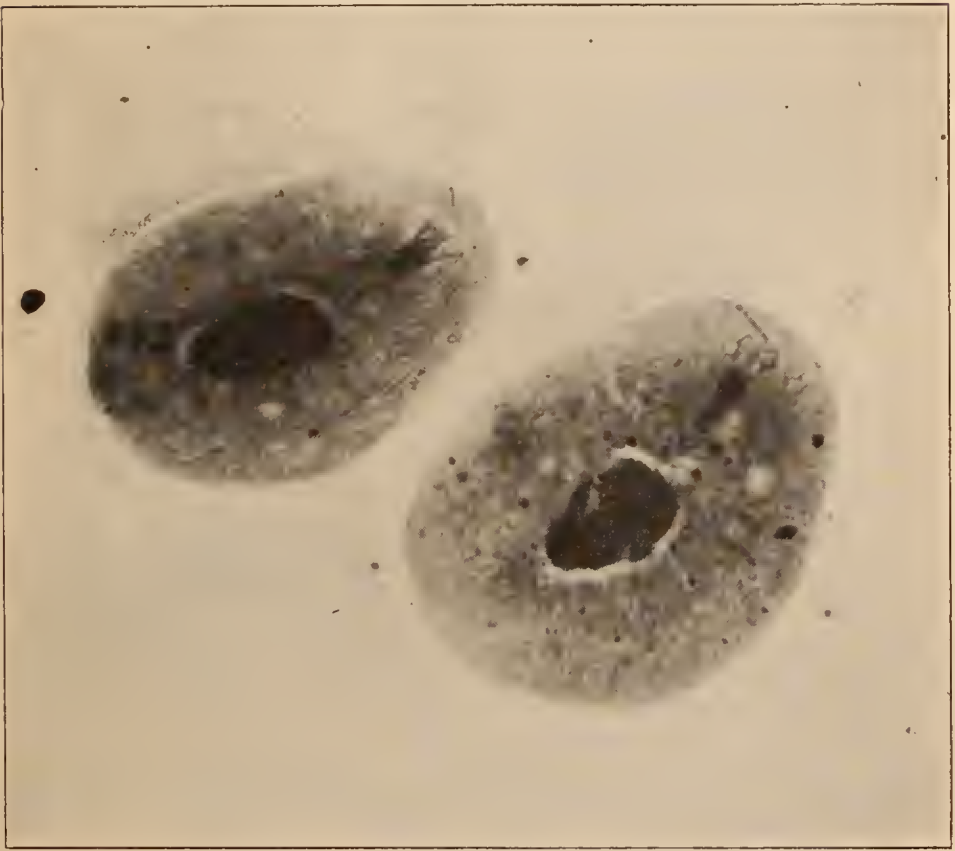

Fig. 2.— *Chilodon truttae* sp. nov. Adult parasites. From a permanent preparation. Magnification about 1200.

Intensive studies of our hatchery diseases and those common to the waters of our public domain are appearing annually in the reports of the Commission. It is contemplated that these shall be brought together eventually in some practical form as a guide or handbook of use directly to our hatchery personnel and to others interested in this larger conservation program of the fishes.

Hatchery Diseases

Chilodoniasis.— This disease has been observed at two hatcheries in the State. The causative organism, *Chilodon,* of which two different species were recognized, is a protozoan parasite active on the skin. Goldfish and trout fingerlings were afflicted, the former more seriously than the latter.

The outbreak of this disease is the first on record among hatcheries in this country, though it doubtless has occurred unrecognized wherever the source of water supply harbors wild fish, that is, a supply derived from streams or lakes as distinct from one whose source is directly from wells or springs. In the two outbreaks noted the water supply in the one case came from a fishing stream, and, in the other, from a lake containing many species of wild fish.

Symptoms.— To the naked eye there is little evidence of the presence of *Chilodon* until the disease has progressed to an advanced stage. The conspicuous signs are loss of appetite, a complete refusal of food, and the tendency to lie on the side on the bottom of the trough. By this time also there is discernible a thin grayish mucous film covering affected parts, chiefly the fins, though the organisms spread eventually over the surface of the body. In the more scaly fish, such as the goldfish, entire sheaves of scales may be loosened and drop away exposing large denuded patches of skin. Badly afflicted fish die suddenly at any point along the bottom of the trough. For adequate diagnosis the aid of the miscroscope is essential.

Description of the Organism.— The two species of the genus *Chilodon,* differ primarily in form. The species *Chilodon cyprini* (fig. 1), is heart shaped at the base, while *C. Truttae* sp. nov. (fig. 2) is not so indented, but more oval in outline, otherwise the resemblance is close. The former was described in Germany by Moroff (1902), who ascribed to this species the origin of serious trouble among the carp, goldfish and other cyprinoid species retained in ponds or aquaria. Its attack on members of the trout family was not observed at that time. From the observations in this country, both parasites are menacing and attack scaly as well as smooth-skinned fish, the species *Chilodon cyprini,** however, being especially rapacious on goldfish.

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* The organism *Chilodon cyprini,* was observed in the experimental fish hatchery at Cornell University during the spring of 1923 and 1924. Dr. Geo. C. Embody placed material at our disposal for study, and courteously permitted us to assist in the experiments conducted to rid the hatchery of the parasite. The species *Chilodon truttae* sp. nov. was observed in the State Hatchery at Saranac Inn, N. Y., in June, 1924, where the parasite attacked fingerling brook trout and landlocked salmon.

Multiplication of the organism occurs rapidly. A mature individual (fig. 3, A) divides by binary fission (fig. 3, B) into two approximately equal forms. By this means the spread of organisms over the skin is mainly accomplished. New and subsequent infections doubtless arise through the maturity of an encysted form (fig. 4), from which countless juveniles come forth. These cysts start development on the skin, though they eventually drop off and are either swept away by the current or settle to the bottom of the trough, where lodgment may be effected in the cracks or crevices, and so become a future menace.

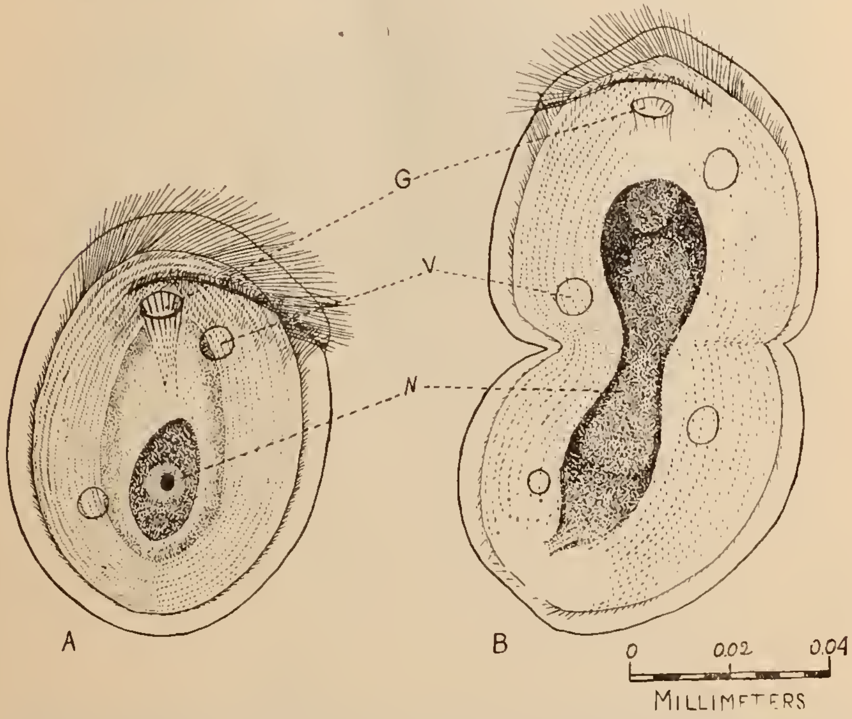


Fig. 3.— ***Chilodon truttae*** **sp. nov. A, adult parasite; B, adult undergoing division into two organisms; G, gullet; V, vacuole; N, nucleus. Outlines from camera lucida drawings.**

Control Measures.— Fortunately this organism is susceptible in an unusual degree to salt solution. The ordinary salt bath (2–2½ per cent solution), which has become a part of the established routine in a hatchery for ills of an indefinite nature, is in this instance especially efficacious, one or two applications being usually sufficient.

In combatting this disease it is essential to kill the parasite on the fish as well as the individuals that fall off the fish into the trough. Both fish and trough, therefore, require to be considered in the control measures. Brushes, scap-nets and other utensils used in the troughs must also be cleansed. In the main this is accomplished when the salt is put directly into the troughs containing the afflicted fry or fingerlings.

In wild waters *Chilodon* is doubtless not rare, but conditions favoring its intensive development probably never exist there, whereas in aquaria, in hatcheries and their associated ponds, the disease may become endemic.

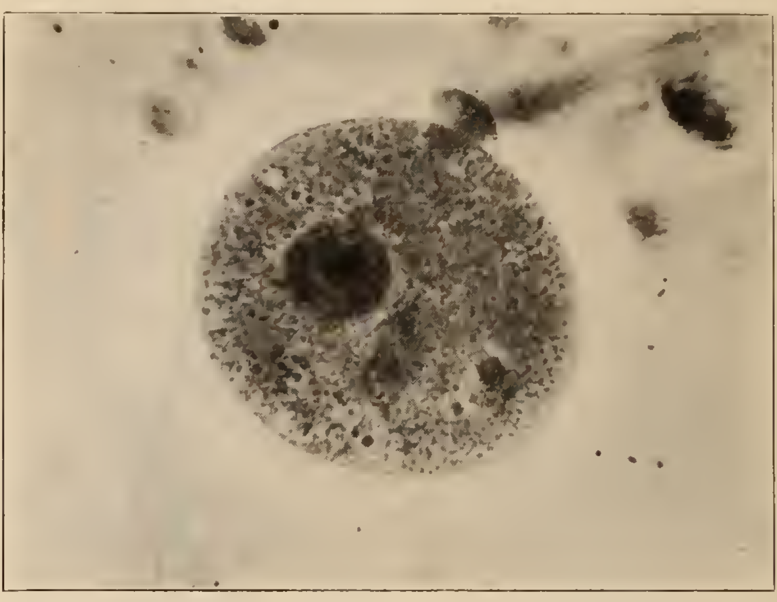


Fig. 4.— *Chilodon truttae* sp. nov. Adult passing into encystment stage. From a permanent preparation. Magnification about 1200.

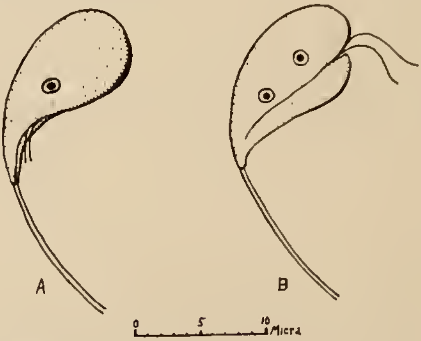


Fig. 5.— *Costia necatrix.* Outline drawings of adult parasites. A, side view; B, undergoing division.

Costiasis.— The causative organism of this disease, *Costia necatrix* (fig. 5), was described in the twelfth annual report of the Commission (Moore, 1922). Its mention at this time is to give additional emphasis to prescribed methods of control and to new features of importance in its natural history.

The organism, *Costa*, like *Chilodon*, produces, through the irritating effects on the skin a similar excessive exudation of slime. The behavior, also of afflicted trout species is the same and renders adequate diagnosis difficult without the aid of a microscope. It is much smaller than *Chilodon*, multiplies more rapidly by ordinary division (fig. 5, B), and yields less readily to the salt baths, requiring successive treatments, at least four at intervals of three days each.

By reference to the photograph (fig. 6) an idea is gained of the mode of attack of *Costia*, and the seriousness of a heavy infection. The minute cells of the outer skin, as shown, may become surrounded by the organism, each penetrating beneath the cells by means of the bristle-like appendages. Such irritation keeps the outer layer of skin in a state of continual disruption and the badly afflicted victim seldom survives a prolonged attack.

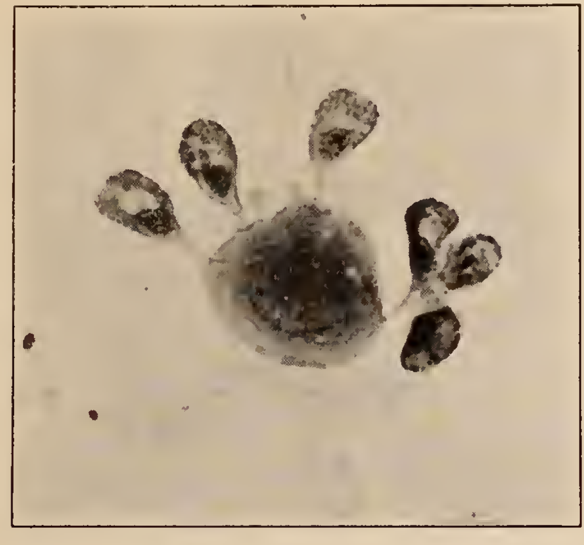


Fig. 6.—*Costia necatrix*. A single epidermal cell showing method of attack by *Costia*. From a smear preparation. Magnification about 1200.

Hydrocoele Embryonalis.—This disease passes under the common name of "blue swelling," "yolk-sac dropsy" and "white spot." It is primarily a disease of a dropsical nature with characteristic color symptoms; for example, a bluish color of the enlarging yolk-sac in the early stages, and the appearance generally of a white spot in the yolk as the disease becomes fatal. The malady is widely distributed in this country and in Europe. In epidemic form it occurs sporadically, though individual cases are frequent in the hatcheries.

Description of the Disease.— The enlarged yolk-sac attracts notice about two days after hatching. The stricken fry weighed down by the unwieldly sac (fig. 7) become less active and tend to huddle in the middle of the trays rather than to distribute themselves in the dark corners as is their wont. The sac becomes filled with the dropsical fluid, transparent at first and later turbid. The yolk itself appears as though filled with suspended drops of oil in a watery fluid. As the disease progresses there is a contraction of the yolk forward and a pressure against the heart. By this time the yolk and serous fluid are sharply differentiated as indicated in the figure (fig. 7).

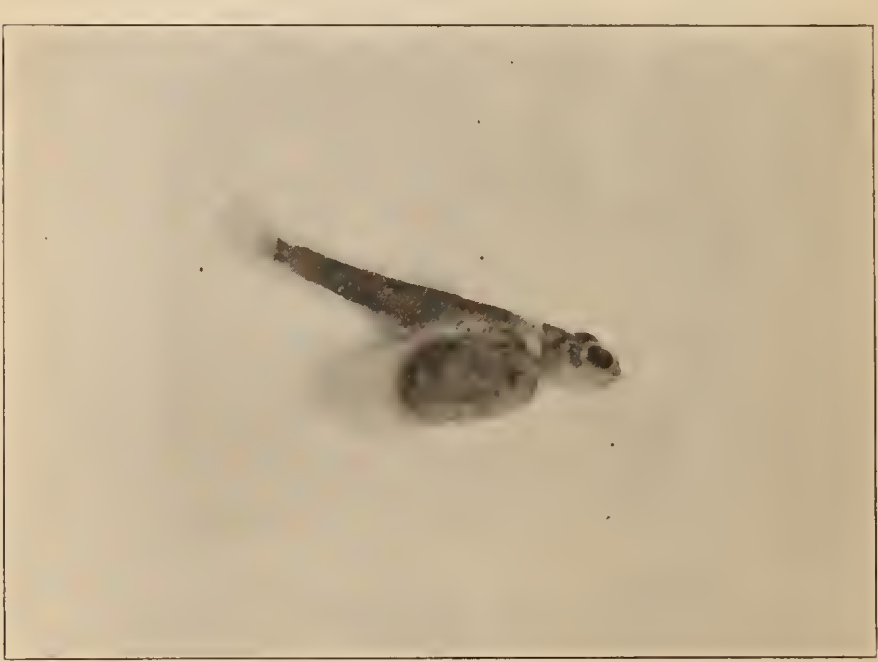


Fig. 7.— Sacfry of brown trout showing affliction known as hydrocoele embryonalis. Magnification about 2.

In Europe this disease has been described by Hofer (1904), who brought together the previous literature on the subject. According to him the concensus of opinion among the German fish culturists indicated that a predisposition to the disease followed any unusual jarring of the egg in transportation, a carelessness in handling, or excessive pressure in the stripping process. More recently von Betegh (1913), studying the same disease at Fiume, arrived at the conclusion that it is an infectious disease caused by some specific agent. He ascribes to yolk-sac dropsy as the causative agent a

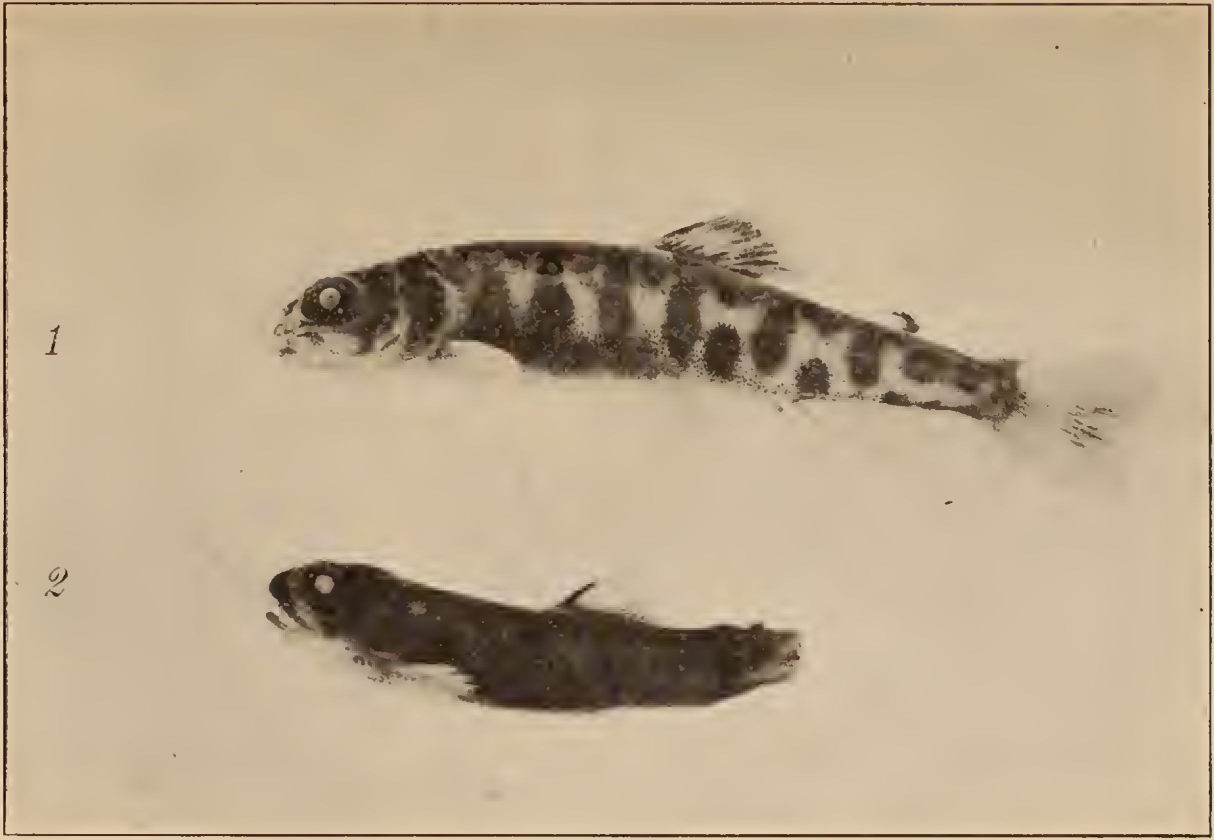


Fig. 8.— Rainbow trout fingerlings. 1, normal specimen; 2, fingerling afflicted with "tail rot." Magnification about 2.

diplobacillus (*Diplobacillus liquefaciens piscium*) which can be isolated from the yolk-sac where it exists in pure culture.

There is no doubt that the disease is infectious, and as such, follows the development of a specific organism. The suddenness with which the fry are stricken and the sporadic nature of the epidemics point to this conclusion. Our own investigations, while tending to confirm von Betegh's findings, are still incomplete, and await further elucidation of double or even multiple infections.

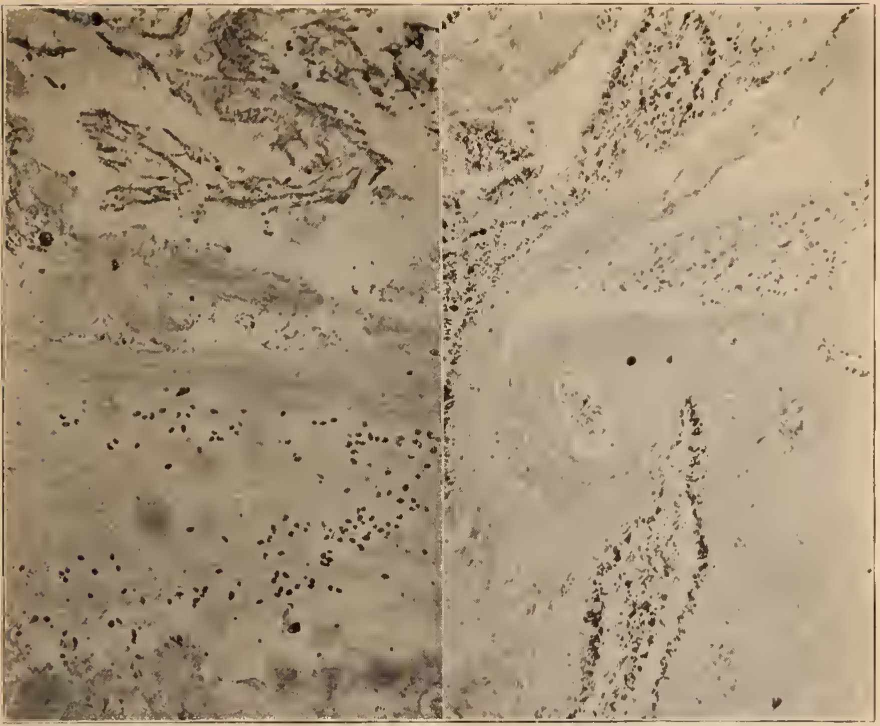
Tail Rot.— The photograph (fig. 8, 2) illustrates a pronounced case of this disease, and the stage in its progress at which most fatalities occur. The malady has been observed but once. Then it was confined to young rainbow fingerlings of the latest hatch in the season. The disease ran its course rapidly, covering a period of about three weeks with the peak of mortality at about the second week.

The "rot" has thus far been observed in cases of double and heavy infection with *Octomitus*. The lesion, however, seems directly associated with an organism distinct from this and presumably a bacterium, a slender rod constantly associated with the lesion but not yet successfully isolated. The disease apparently progresses through the muscle fibres. A preliminary softening of the tissues surrounding the bundles of fibres occurs and finally a complete dissolution and break-down of the muscle follows. Such disintegration advances beneath the skin considerably ahead of the external signs of "rot," though a critical examination discloses a slight swelling and softening of affected parts.

Before any suggestion of means of prevention can be offered it is essential to have more information of the disease producing organism. The lead thus far secured, however, through a study of the tissues affected should make this a possibility in the near future.

Octomitiasis.— Further progress in the study of this disease (Moore, 1922–23) is related to the effect of the parasite on the reproductive glands. Mention has been made in the previous papers that adult fish remain carriers of the organisms in the ceca and intestine though seemingly unaffected by their presence there.

Recent studies indicate that in such carriers the reproductive capacity may be directly affected by an invasion of the reproductive glands (fig. 9). That this strikes at the very heart of fish culture cannot be doubted. The indications are that the male fish is more readily subject to this encroachment by the organism than is the female, though this view is not yet fully established. In the testes the presence there of large numbers of *Octomitus* is associated with the disintegration of this tissue. In the breakdown all the characteristic tissues suffer obliteration, sperm producing tissue and blood vessels alike affording a marked contrast histologically between the normal (fig. 10) and infected (fig. 9) organ at approxi-



Figs. 9–10.— Sections of male reproductive glands (testes). Fig. 9, showing infestation by parasite *Octomitus salmonis*, the small pear-shaped bodies. The large spherical body at the left is a spore of an accompanying amoeba. Fig. 10, showing part of the same gland not yet invaded by the parasite. The dark patches are the maturing sperms ("milt") each of which is considerably smaller than the adult parasite. Magnification about 250.

mately the same stage of maturity. How such infestation of the reproductive gland affects the problem of fertilization is not yet clear. It may result in a sterility of milt, followed naturally by the failure to fertilize, or the infected milt may itself be the means of carrying infection over into the egg.* The problem requires much study along this line. It is not an uncommon occurrence to find among the carrier brood stock examples in which the reproductive glands are abnormal, highly inflamed and in part atrophied. In all cases this condition appears not to be traceable to invasion by *Octomitus*.

In the same category of negative results must be placed a number of cases of adult male trout of our natural waters in which atrophy or slow development of the testes occurred, and in which no indication of parasitism by *Octomitus* was present. Whether this condition is explainable on the ground that an interruption in the maturity of this organ may be expected along quite normal lines or whether it represents a pathological condition cannot at this writing be stated.

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* Studies on this phase of the question have been begun at the New York State Veterinary College, Ithaca, where facilities for conducting culture experiments have been placed at our disposal.

Data at hand from the U. S. Bureau of Fisheries show that *Octomitus* is wide-spread in the United States, the later observations locating it in the salmon fingerlings of several hatcheries on the Pacific Coast. In a recent paper, "The Intestinal Parasites of Trout" (Davis, 1924), it is set forth that *Octomitus* is frequently associated with an amoeba, whose entry into the problem at the moment complicates it, yet promises substantial help in its final elucidation.

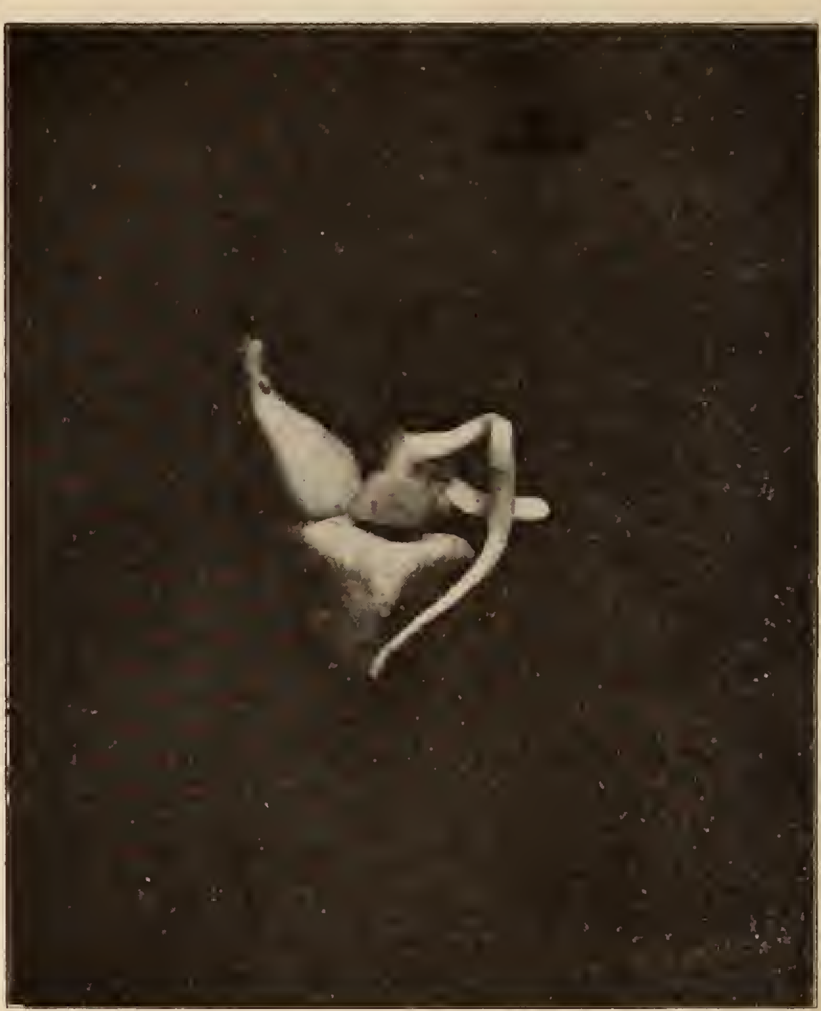

Fig. 11.— Heart of Adirondack frost fish, showing larval tapeworm (*Bothriocephalus* sp.) suspended in the collapsed wall of auricle and sinus venosus. Magnification about 2.

It is worthy of note that in so far as the studies of *Octomitus* have been extended into an examination of trout in natural waters the results have been generally negative, and indicate that *Octomitiasis* presents a menacing condition only in the hatcheries and associated ponds where insufficient range is provided and natural food is unobtainable.

Diseases in Public Waters

Fewer reports than usual have come to the Commission this year of disease among fish in public waters. The one outstanding trouble to which inquiry has been directed is an affliction more or less common among the Adirondack frostfish (*Coregonus quadrilateralis*). Dead fish in considerable numbers have been found along shore and in the open lakes at frequently recurring intervals during the summer and early fall. No external marks of disease are apparent and there is little. if any, emaciation. To all appearances the fish succumb quickly. The diagnosis follows:

Bothriocephalasis.— The disease is due to the perforation and pre-emption by a larval tapeworm (*Bothriocephalus* sp.) of the auricular chamber of the heart. the sinus venosus. and adjacent entering veins. In the photograph (fig. 11) a single worm is shown suspended in the collapsed wall of the auricle and sinus. Often two or three worms become domiciled in the auricle threading in and out of the delicate wall so that a loop of the worm will hang free in the body cavity. They may in their wanderings clog the hepatic vein, or migrating still further, perforate the liver itself. Obviously the worms are there for blood! The sequestration in the auricle and the clogging of the entering veins seem to be the most serious phases of the parasitism and a sufficient explanation of the cause of death.

In all post mortem cases where fish were salvaged, either at the point of death or shortly thereafter, the infestation of the auricle was accompanied by severe hemorrhage. In a large percentage of live fish taken in gill nets for the purpose of carrying the investigation further, this type of parasitism has been likewise frequent. Barring occasional mild infestation of the intestinal tract by another species of tapeworm the fish are singularly free of other disturbances and appear in all respects normal and healthy. Doubtless, the fatal lesion may occur when the auricle becomes perforated or the entering veins are clogged, or in other ways the vital function of the organ is interfered with.

Economic Bearings.— The Adirondack frostfish is one of the characteristic species of the lakes of the region. While its excellence as a table fish is well known, though its capture is difficult with hook and line because of its small mouth, its chief importance lies, according to the fish culturists, in its contribution to the food supply of the lake trout. On this account its distribution by transplanting has been fostered.

The desirability of and interest in promoting the lake trout fishing in these waters emphasizes the need for further investigation of the contributing sources of this parasitism of the frostfish. The solution of the problem lies in pushing the studies into the extensive and little-known field of parasitism involving one or more hosts, the cat, dog, or man, being the definitive host harboring the adult stage of the worm. This larval tapeworm, belonging to the genus *Bothriocephalus* (*Dibothriocephalus* or *Diphyllobothrium*), is now commanding considerable attention among parasitologists and by the medical profession. The identification with the accompanying description of the species infesting the frostfish has been supplied by Dr. Edwin Linton. It is appended herewith:

Bothriocephalus sp. — A small collection of cestode larvae belonging to the family *Diphyllobothriidae*, from whitefish of the Adirondack lakes of New York was sent to me for identification by the Conservation Commission, Albany.

The letter which accomplished the collection states that they were found in the wall of the auricle and the venus sinus of their host.

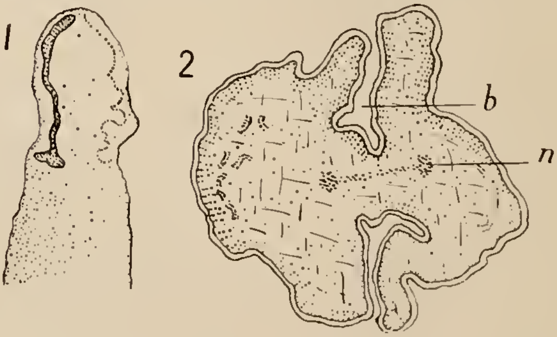

Fig. 12.— *Bothriocephalus* sp. from auricle and sinus venosus of Adirondack frost fish. 1, diagonal view of scolex, sketched from specimen mounted in balsam. Diam. of scolex, middle, 0.4 mm.; length of bothrium 0.7 mm. 2, transverse section of scolex. *b*, bothrial pit; *n*, nerve. Diam. 0.63 mm. Drawings by Dr. Edwin Linton.

The largest specimen, mounted in balsam and slightly compressed, measured about 30mm in length and 0.8mm in greatest breadth. It is of about the same breadth throughout most of its length and bears no indication of segments. The bothria are indistinct, but indicate a scolex about 0.9mm in length. The body tapers posteriorly to a bluntly rounded point, the breadth being 0.6mm at a distance of 0.5mm from the posterior end. This specimen was somewhat flaccid. Another specimen, more robust, is somewhat irregularly rugose, but without indication of segments. The length is about 20mm; the breadth, compressed, in balsam is 0.9mm at the widest part. It is of nearly uniform breadth for the posterior three-fourths of the length, then tapers gradually to the anterior end. The length of the bothria is about 0.6mm. Another scolex (Figure 12) is about 0.9mm in length. The bothria have rather thin and flexible walls, and are dorso-ventral in position. In a series of transverse sections the nerves are conspicuous in sections near the anterior end of the scolex, but the lateral vessels of the excretory system do not appear until the strobile proper is reached.

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FIRST REPORT OF STATION FOR SHELLFISH CULTURE

Few are aware that oysters are a cultivated crop. The acres of carefully tended oyster farms are not visible under blue fathoms of sea water, and unless one has seen dredge boats piled high with thousands of bushels of this delicate product, his curiosity is unlikely to be aroused further than different ways of eating them. It may then come as a surprise to learn that oyster culture is more like farming than fishing.

Seventy thousand acres of land, cultivated under water, bring to harvest New York's most valuable sea crop. All this ground is ploughed and harrowed, planted and transplanted, cultivated and harvested. The relationship of the oyster dredge to the plow, the cultivator and the harvester may seem distant; and truly the cultivation of animals in much the manner of plants appears strange—yet the oyster grower is a real planter.

There is, however, one fundamental difference between agriculture and this branch of aquiculture. For the more than a thousand years that oysters have been cultivated the grower has had no control over his supply of seed. Imagine the state of agriculture if each season the farmer did not know how much seed he had to plant. While improvements in culture have been made by furnishing places of attachment for the "spat," as the oysterman calls the baby oysters when they settle down, with all these aids the quantity of oysters has continued to diminish. Propagation as well as cultivation is necessary in any complete system of culture.

It was not until 1920 that the possibility of propagating oysters was first demonstrated. The microscopic size of the eggs, several million of which could be put in a teaspoon, had frustrated all previous attempts to change the water without losing the tiny larvae. By adapting centrifugal principles for separating the hatching eggs from the water, the New York State Conservation Commission succeeded in raising eggs to the adult stage. Of course, this scientific experiment was conducted as an investigation of nature's failure to produce seed. In spite of the fact, however, that it was conducted on a laboratory scale—its surprising success offered the hope that the process could be made practicable for the artificial production of seed.

In order to do this, it would be necessary to use such materials and equipment as would be practicable on a large scale. In thus expanding, numerous difficulties have been encountered and overcome. Last year we finally succeeded in rearing a crop under these conditions, and we now have artificially propagated oysters of an edible size. This year the first station for experimental shellfish culture has been established on Long Island. An experimental hatchery planned to develop a million "spat" per season has been equipped and operated at Oyster Bay, and commercial quantities of larvae have been developed to halfway stages in our hatching jars. After these stages are reached, more space is required for the rapidly growing forms, and the mechanical operation of larger tanks has been tested. Seed is being matured under natural waters at a controlled sea farm near Glen Cove. The necessary experiments for the design, equipment and operation of a commercial sized hatchery have been performed, and we are now prepared to demonstrate a complete system of shellfish propagation. What this will mean in removing the gamble from oyster culture every grower realizes. The importance of a large industry to the state, producing as it does a valuable food for the people, is evident to all. Yet no one can foretell the possibilities of improving the qualities of shellfish by breeding from selected stock. Unless the nature of oysters is entirely different from every other domesticated animal and plant, we have but to reflect on the improvements made by agriculture to imagine the future oyster. Not only oysters, but similar shellfish such as clams and quahaugs and scallops may be propagated by this process.

The shellfish hatchery at Oyster Bay where oyster experiments are conducted.

Recognition.—The general recognition of the need and value of such an experimental station is shown by the widespread interest which has been aroused. Newspapers and periodicals not only in New York State, but thoughout the country have carried extended accounts of the results, proving that the general public is deeply interested in what is being done. Numerous inquiries have been received from Europe as well requesting detailed reports, and large numbers of visitors have come to the hatchery to obtain first hand information.

Outside of shellfish hatchery, Oyster Bay, tank for propagating oysters shown on pier.

Long established industries are often reluctant to admit the possibilities of pioneer scientific results, realizing the great step from theory to practice. It is encouraging, therefore, to note that many of the larger and more progressive growers from Massachusetts to Virginia have felt sufficiently concerned to visit the Station. When they witnessed the machine deliver millions of larvae—numbers greater than large boats can dredge, with crews of men—they were quickly convinced that the first steps at least are practicable. In fact, the ease with which this could be done sometimes obscured the remaining difficulties which have not been so completely solved, and there is grave danger in the conclusion that the problem is too simple. The anxiety of every grower over the future supply of seed makes any promise important, but for many years they have preferred their own council to the untried suggestions of science. At present they are facing the issue squarely, and recognizing the hope that lies in experimental work. Several have established contact with scientists and at least one has been carrying out experiments on artificial propagation.

For two years the Federal Bureau of Fisheries has been studying shellfish hatching across the Sound. This summer members of the Rhode Island and Connecticut Shellfish Commissions have visited our station, and were so impressed as to state their intention of endeavoring to get those States to follow our example. The State of Washington has also commenced studies on artificial propagation.

On May 15th a very instructive meeting of the National Association of Fisheries Commissioners was held at Baltimore, Md. The progressive work of New York State attracted considerable attention and the Association voted to meet next year at New York City, electing Commissioner Alexander Macdonald as President. This will give an excellent opportunity for the various State officials to inspect our station and sample its products. At the same time the first purification plant at Inwood may be visited as an example of practical results obtained by scientific investigation.

Nineteen twenty-four Program.—Before the commercial practicability of a shellfish hatchery can be demonstrated, it must be proved that the yield of year old oysters from limited areas of surface used for intensive collection warrants the increased cost of intensive culture and also that spat in great numbers can be economically propagated from the eggs. While the various steps involved in such a system of culture already have been demonstrated independently and experience indicates the possibility of connecting them commercially, we have never had the facilities for carrying out all the steps together on sufficient scale to obtain positive proof. For this it would be necessary to have both an experimental culture bed and to enlarge the hatchery layout to a semi-commercial scale. The establishment of a station for experimental shellfish culture made such an attempt possible and so the double program of locating and testing out an experimental sea farm and the equipment and operation of an experimental hatchery was decided upon.

Experimental Sea Farm

Many practical growers who seem to be convinced that the hatching of the eggs in commercial numbers may be accomplished, still fail to see how it will be possible to handle the set intensively on a large enough scale to be of importance to the industry. The difficulty seems to be that they are accustomed to planting hundreds of thousands of bushels of shells over thousands of acres of ground to catch the set needed today. Although in Europe this method of securing young oysters was abandoned half a century ago because of its uncertainty and wastefulness and, by intensive collection on artificial collectors, the industry has been developed to a much larger extent than was previously possible, the wonderful success of extensive shell planting in this country is still rooted in the minds of the older generation and makes it difficult to gain a fair judgment of the facts on which the system of intensive culture is based. This has much complicated the problem of artificial propagation because the growers themselves have more experience and greater facilities for maturing the seed. It has, therefore, been necessary to take set obtained by intensive collection and plant it under commercial conditions and mature it for a year until it can be of recognized value as seed to every planter.

Requirements.—This may seem a simple matter, as indeed it would be with the facilities of any large grower. With ground known by long experience to be suitable, with boats adapted to the work and men skilled in handling oysters, such an experiment is not difficult. To build and prepare collectors, plant them in areas where a strike of set in sufficient concentration is likely to occur, to take them up at the right time and remove the spat, to shelter them during the winter and plant them in the spring on ground which is hard and clean and not subject to the ravages of enemies and storms and to watch them through the summer is not easy without such facilities. Consequently, the expense of such a procedure is apparent, while the yield has never been determined. Our problem was therefore to find some manner of meeting these requirements and to determine the yield.

Locating a Shellfish Farm.—In the limited experiments on intensive set collection during the years of 1922 and 1923 at Great South Bay, fully half a million spat have been caught on artificial collectors. With proper attention these would now be several hundred bushels. Without any means of caring for them, a large part have been sacrificed and the remainder turned over to growers. Small samples have been matured in improvised trays built in the small tide pond at Cold Spring Harbor.

This year we have been extremely fortunate in locating a large, controlled tide pond adapted to the problem and have secured the privilege of planting the seed and making observations on its growth. The pond is situated near the shore and receives its waters from the open Sound. It is about three quarters of a mile long and one quarter of a mile wide and is covered at high tide with about three feet of water. Large areas of the bottom are hard, clean gravel, suitable for planting small seed oysters, and certain of these areas have been found to be free from many drills, starfish or other enemies of the oyster. Large tide gates ordinarily keep the pond from draining out completely, but at times they are left open and it is then as possible to work directly on the beds as it would be on any farm. Enough water is allowed to pass out on each tide to give excellent circulation and to keep the pond always in the best possible condition. It has been found admirably adapted to shellfish seed culture and at all times the bed could be readily inspected and observations noted in the development of the oysters. A close watch has been maintained and at no time were the oysters disturbed — a condition hard to satisfy in accessible places along the sea shore. Altogether this unusual combination has proved of utmost value in carrying out experiments to determine the yield from detached seed under suitable natural conditions. Although the experiment was conducted on a small scale, it was under conditions to be found over large areas along the coast.

Harvesting artificially propagated oysters.

Intensive Culture of Set.—In last year's report three photographs of intensive set caught on artificial collectors were printed.

One shows the assembled collector, the second a removed plate and the third a detailed full sized illustration of "corn on the cob" set in which twelve young oysters are attached to two square inches of surface. These photographs were taken November 6, 1923 and at that time a sample of six and one half quarts of this set was scraped off the collector and expressed to Cold Spring Harbor where the oysters were spread in a tray in the tidal pond until cold weather in December. This sample contained about seventeen hundred young oysters representing the set from one square foot of collector plate. A bushel would have contained eight thousand and fully fifty thousand set on the collector.

When the hibernating temperature was reached, these oysters were packed in a box, open only at the top, and submerged well below reach of ice through the winter. As soon as the ice disappeared in the spring, the box was again dumped into the tray and the oysters rinsed thoroughly to remove the slime which had gathered on them. A slight deposit of black mud was also found in the bottom of the box, but except for a few oysters in the corners, all were alive and apparently healthy. The condition of the pond, however, had become impossible by the great amount of drift which had been swept in by the heavy northeast gales and it became necessary to find some other place for our experiments. The salt water pond above described was finally located and early in June this seed was transplanted to natural ground. In all, sixteen hundred and fifty young oysters from the 1923 set of Great South Bay were transplanted to the new pond, making six and a half quarts of set. At first they were planted in a slough where water would stay over them even when the pond was drained. This place soon proved quite unsuitable because of the wash of the channel and the infestation by drills from nearby grass. On July 11th, thirteen and one half quarts were hastily gathered and transplanted to a more favorable bar. It was estimated that already about fifteen percent, or some two hundred and fifty, had succumbed to the ravages of the drills.

On September 22nd, an examination of the new bed was made and only one or two dead oysters found. The seed was counted and measured and ten hundred and fifty were found to measure forty quarts. An examination of the old bed yielded about sixty more oysters showing the mortality of those which were not transplanted to be about seventy-five percent. The contrast was striking and showed what can be saved by suitable planting.

On October 13th another examination was made when eleven hundred and ten seed oysters measured fifty-two quarts. This represents eight and two thirds quarts for each quart planted. Before cold weather arrives there is more than a month of active growing season and it is believed that these oysters will then measure two bushels, or ten quarts for each quart planted.

Yield From Intensive Seed Culture.—It is apparent that the significance of this experiment does not lie in the great quantity of seed produced, but in whatever facts it may prove concerning the yield that may be expected by intensive seed culture. First, it should be remembered from the description of the pond that the small experimental plot represents many acres of ground equally capable of developing many thousand bushels of oysters. Moreover the pond itself is but one, and not necessarily the best of such planting grounds which fringe the Atlantic coast.

The question then reduces to just how much effort is required to produce a bushel of such seed by intensive methods, and what value such a bushel of seed may have. A recapitulation of the results may be given as follows:—

1. Set was collected intensively on artificial collectors in July, 1923 at Great South Bay—at a concentration of six per square inch and representing over seven hundred and fifty per square foot and fifty thousand per collector.
2. A sample of this set representing about one square foot of collector plate was detached in November, expressed to Cold Spring Harbor and kept until freezing temperature in a tray in a tidal pond.
3. This sample of set was stored during the winter in a box six inches deep, kept below the reach of ice.
4. In March, 1924, this set was again spread in the tray until June when it was removed to a tidal pond near Glen Cove.
5. In July, two thirds of this sample was transplanted to a more suitable ground on a natural bar.
6. In October, this two thirds measured nearly two bushels, representing a growth of over eight times the volume transplanted in April—even though nearly all the remaining third was destroyed by drills.
7. Sufficient growth could be expected before winter, and with the experience gained to assure a yield of at least ten bushels of seed for each bushel of such set on such ground in one year.
8. At least a bushel of superior single seed oysters, worth at least two dollars, can be the expected yield from "corn on the cob" set on one square foot of collector plate, by one years intensive seed culture.

It follows that a collector of twelve plates, each two feet square, can be made to yield fifty bushels of superior seed oysters valued at about one hundred dollars by the methods described above.

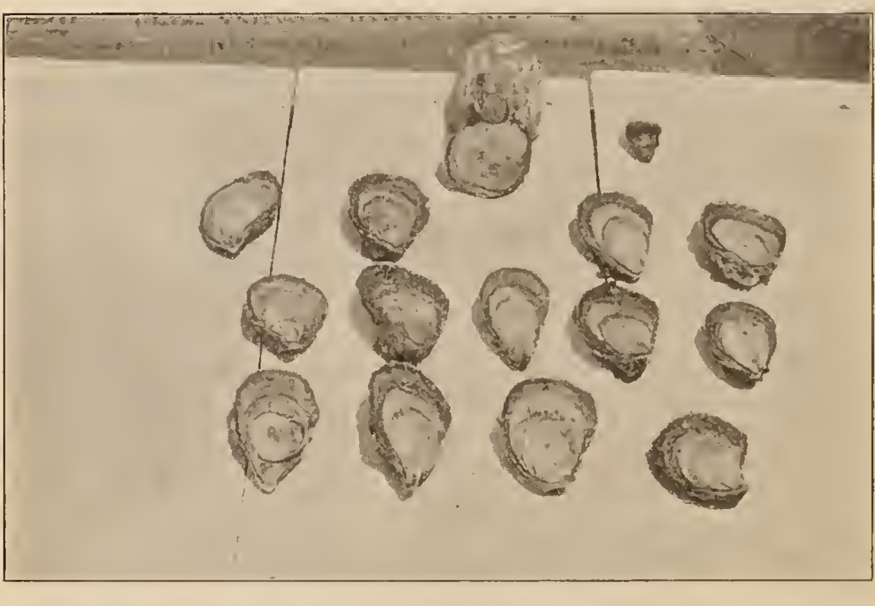
It therefore appears that the idea of intensive seed culture is practicable on its face.

Cost of Intensive Seed Culture.—In conducting this experiment, no direct accounting of costs of each step was possible. It was carried on as best we could with other work which demanded continuous attention. Advantage has been taken of such opportunities as occasion offered. Obviously no price can be set upon the generosity of those who contributed to the final result, and if we had detailed figures on a small scale operation, they would have little bearing on the expenses of a commercial enterprise. The best we can do is to enumerate the steps involved in a unit of production and set some figure on each to fix attention while forming a judgment. A single collector and its yield based on the preceding discussion will be chosen for this purpose. Allowances which it is believed no one will question after visualizing the operation and which our experience indicates are far too high will be made.

Yearly maintenance of collector	$10.00
Planting and recovering collector	5.00
Detaching the set	10.00
Growing one bushel of set two months in trays	5.00
Storing five bushels set through winter	5.00
Planting five bushels of set in spring	2.00
Harvesting fifty bushels of seed in fall	5.00
Total	$42.00

Value $100.

Although these figures have no value as a basis of estimating costs, they serve to show that each step has a reasonable possibility and taken together the whole operation is quite readily probable. Until it is proved that such allowances are not sufficient, no one can say that intensive culture is impractical. The promise they hold is certainly well worth a fair trial on a large enough scale to determine their value.



Oysters collected on a cup in Great South Bay in 1921 compared with one-year-old oyster shown at Right of cup.

Growth of Oysters.—After the seed oysters have reached the size just described, they may safely be planted in deep water beds. The present extensive methods of cultivation with power dredge boats have in no way failed, and the crop is surer today than it ever was if a dependable supply of year old seed can be assured. Such problems as arise in connection with this part of the industry have even been reduced by the surplus of land over such seed as is available and it is not necessary at this time to investigate the growth of oysters further than to throw light on the economic requirements which must be met in the production of seed. For this purpose it is valuable to estimate the various factors which determine the success of the industry under given conditions, and a measure of the growth from year to year is quite important.

In 1921 a cup was saved on which twenty spat had attached. These oysters have been kept in a tray and the growth measured from year to year. They are now three and one half years old and the following average measurements have been recorded.

Date	*Length*	*Width*	*Weight*
November, 1921	1.2 inches		3 grams
November, 1922	2.7 inches	1.9 inches	37 grams
November, 1923	3.4 inches	2.6 inches	90 grams
November, 1924	3.9 inches	2.9 inches	131 grams

A comparison of the figures for two and a half and for three and a half years with those given by Nelson for Barnegat show a reasonably close check. Combining these two sets of figures and smoothing out slight irregularities, we have a sufficiently reliable chart of growth under normal good conditions to refer questions of culture.

Age, years	*Length, inches*	*Weight, grams*	*Oysters per bushel*
½	1.4	6	10,000
1½	2.6	37	1,000
2½	3.3	81	500
3½	3.9	140	300
4½	4.6	220	200
5½	5.2	314	150

It should be pointed out that such figures show only the growth of the individual oysters and in no way indicate what yield of oysters a bed will give unless the loss in numbers is known. They can be used, however, to indicate the loss in numbers if the yield is known. In fact, this is their most valuable use, because until the grower knows how great this loss is by different methods of culture, it is impossible to realize the possibility of return for added expense of improved culture.

During the winter months from December to March the oysters cease to feed and grow. Their nourishment is then derived from materials deposited during the fattening season in the fall. Instead of increasing in weight they actually lose weight. The oysters which averaged 90 grams in November, 1923, weighed 82 grams average in the following March, showing a loss of 8.8 per cent. When it is considered that this is a gross loss which actually takes place in the flesh of the shellfish, the percentage loss in meats is quite considerable. It is of interest also to note that the largest oysters, that is the oysters which grew fastest, showed the highest percentage loss, or about 13.2 per cent as against 1.2 per cent for the smallest. Oystermen generally recognize this shrinkage, for as they say oysters get poor in the spring. Oysters are at their best from Thanksgiving to Christmas.

Shellfish Hatchery

The intensive cultivation of seed appears from the foregoing to depend upon the success of intensive set collection. This in turn requires a sufficiently dense concentration of spat to make economical handling of immense numbers practicable. The possibility of securing such concentrations under natural conditions seems to be demonstrated, but uncertainty as to the regularity with which this can be accomplished still remains. This year the set in Great South Bay was negligible but that in Barnegat was sufficient to meet the demands. The study of the distribution of natural swarms of larvae, as systematized by Stafford and now followed by Gutsell in Great South Bay and Nelson at Barnegat, should greatly help the proper planting of artificial collectors so as to insure the necessary concentration. These collectors can be readily transferred on short notice and advantage taken of such remarkable setting areas and seasons instead of allowing the tremendous sacrifice of the needed set to continue.

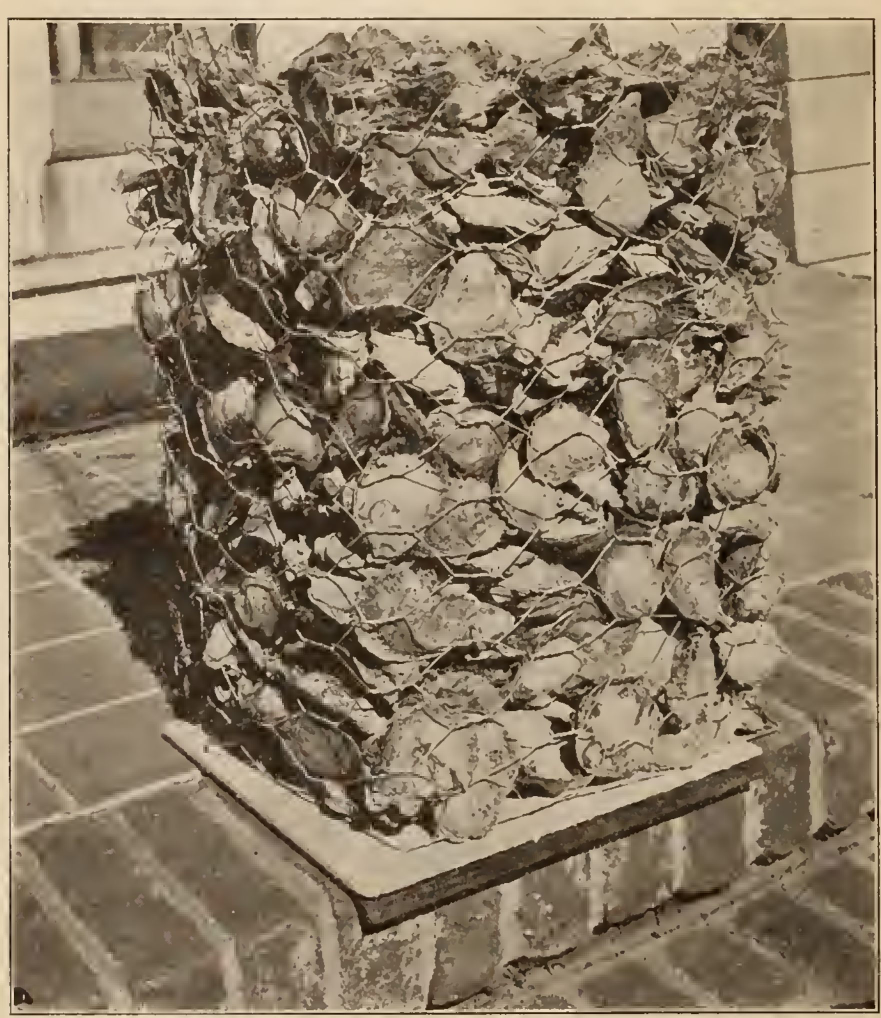
Cup collector from Great South Bay with one of the original oysters set in 1921 still attached. Photograph taken in August, 1924. Two-year-old oyster shown at left.

The artificial propagation from the eggs also offers a means of securing a sufficient concentration of spat on collecting surfaces. It has the great advantage of certainty to offset the obvious disadvantage of cost of hatching. Greater efficiency is also possible because the concentration can be controlled by the time the surfaces are exposed in the setting tanks and materials for collection may be utilized which would be impossible for planting in natural setting waters. The comparison of the two methods of set collection can only be made on the basis of experience, but a careful weighing of the various considerations shows promise from both. Certainly the method of hatching the larvae, if proven practicable, offers such tremendous possibilities in various directions as to make every effort to achieve success worth while. So long as steady progress is made and until reasons are discovered for believing such methods impractical, the experiments should be vigorously prosecuted. Even though this method of securing seed should be postponed for years, as a means of studying set collection, it will prove valuable and as an instrument of research into the mysterious larval life of shellfish, it offers unrivaled opportunity in the advancement of scientific knowledge worthy of the attention of the State.

Stages of Progress.— To establish an art or industry it is necessary to progress through three technical stages. First, the underlying principles must be discovered; secondly, practical materials must be tried out, and thirdly, working methods must be developed. While there is no sharp division in the work, yet, in a general way, these steps follow each other, as all must be satisfied before commercial production is possible.

The results reported last year mark the safe passage of the first two stages and the plan of work this year had as its objective the enlargement of the scale of operation to semi-commercial dimensions. This required the complete rearrangement of our process and the installation of new equipment. With every such change new factors are introduced and new problems arise. Moreover, when the operation commences it must proceed continuously to whatever conclusion may be possible with the plan laid out because the season in which spawn is available does not permit extensive alterations and living material must be attended without interruption.

In many respects a biological investigation must be carried out as a campaign. A definite plan, based on the object to be achieved and the means at hand, is drawn up. All preparations are made that are possible before the season opens. When operation commences it must proceed without a single break to its close. Unforeseen or undetermined conditions resulting from the experiments must be provided for with such equipment as is at hand. And after advantage is taken of every favorable result, the plan must be adapted again to the additional information. Seldom in experimental work does the original plan prove the best. The object is to gain experience and its success is measured by the results of the experience. New problems arising with each new stage of the work require the accumulation of new experience. After the correct solution is discovered the results all seem to come at once, whereas they really followed from all that has gone before. So this year much progress has been made in the accumulation of data on the operation of a commercial sized hatchery which when applied next year should yield the necessary results to demonstrate a practical system of seed culture.



One and two-third bushels of oysters collected on one square foot of collector plate (shown under wire basket). The oysters are one year and a half old.

Plan of Development.— The development from a laboratory to a hatchery operation is considered the most important problem of the experiment station. Considering the magnitude of a fish hatchery, this may seem a serious undertaking. With the advantages, however, of accumulated facilities and experience, with funds for new equipment, better transportation and above all, the conscientious help of Joseph B. Glancy, the expansion of the scale of operation became possible. Last year many millions of eggs were raised to larvae, hundreds of thousands of larvae were raised through their early larval stages, and thousands were obtained as set. It is evident that in their early stages commercial quantities of larvae may be cultivated with comparative ease with equipment already developed. Their rapid growth quickly demands greater space and volumes of water. The limits of capacity of the hatching jars is soon reached and from then on the numbers must be continuously reduced until the setting stage is reached. Consideration of fish hatchery operations will make this simple fact plain. When fry become fingerling size more room is required and soon after open waters become necessary to the young fish. While the oyster larvae are very small, even when they attach, and their individual requirements might easily escape notice, their rapid growth is none the less real, and the tremendous numbers demand attention. From the egg to the setting larva there is an increase of .125 times in volume or weight. Fry which have grown that amount in size are fish and the greater amount of food and water required is obvious.

The principal object of this season was to devise a practical method of handling greater quantities of water for the older larvae. Fortunately, with increasing size and requirements, they became correspondingly easier to handle. It is the very minuteness of the early stages which prevented former experiments from succeeding. The success of methods of handling these difficult stages, therefore, gives plenty of reason for confidence that the last step will also be successfully accomplished. As was explained in the report last year, it is possible to separate the half-grown larvae from the water by means of fine screens. This method was applied in the latter part of the work. This year an attempt has been made to devise mechanical screens permitting automatic change of water, enabling the use of large tanks with continuous flow.

Design.— Following out these principles with regard to equipment and facilities at our disposal, many changes and additions were made. A second battery of five jars was built opposite the four described last year. By using these, in connection with the centrifuging process only during the first half of the larval period, it was estimated from last year's experiments that several million larvae could be accommodated each season at this stage. A platform was built overhead to support the preliminary clarifiers and a clarified water tank was built so that the various operations would not all need to proceed simultaneously, as last year. The large centrifugal was enlarged to a capacity corresponding to the increased jar capacity. The water supply and air systems were considered adequate for the present. With these changes the output of the centrifugal process was increased over three fold with an actual reduction in the labor involved in operation.

In order to provide for the larvae after this stage was passed, a large tank five feet deep by seven in diameter was transferred from Cold Spring Harbor and set up on the pier outside. A small pump was rigged to deliver one gallon a minute continuously into a clarifying box built above the tank. The water passed out of this box through a continuously revolving brass screen and thence through a tube into the side of the cylindrical tank near its bottom. It was delivered into the tank through a bent glass nozzle tangential to the circumference of the tank giving the whole a positive rotary motion. An air jet at the centre of the bottom of the tank tended to turn the water over and in this way circulation was provided. The flow passed out of the tank through another revolving brass screen which prevented the loss of the larvae. A rack for collector plates was suspended in the tank to provide attachment for the spat. One motor operated both screens and the pump, the whole thus being automatic. A temporary shelter was built to keep out the weather from the machinery. Under the bulkhead were built two trays to keep spawning oysters and such other material as required observation.

Operation and Results.— The mechanical operation of the plant as designed and built proved entirely successful. With so many radical changes and adjustments depending each on the other, this record in itself is reason for considerable satisfaction. It is difficult to foresee every combination and it takes but a slight misfit to throw the whole out of gear. At times much patience and ingenuity were required to overcome unexpected emergencies but in the end the whole arrangemnt was working smoothly and methodically. This experience is of great value in future work as it reduces many problems faced at the beginning of the season.

By July 1st the culture jars were rapidly being filled with spawn. Throughout the month these cultures were developing satisfactorily, ready for the setting tank which was being prepared for them. It was desired to get forms at all stages up to the setting size so that before any breakdowns in the untried mechanism of the setting tank were possible some set would be secured. A preliminary trial was made in a smaller wooden tank without continuous flow but while the forms lived several days they did not appear to thrive. The yield of the jars fulfilled our expectations and it was an exciting surprise to visitors to witness millions of active larvae from the centrifuge bowl piled up in a watch glass under the microscope. The oyster growers in particular, who realize the labor and expense of dredging and transplanting so many oysters, were astonished to find a machine in so short a time transfer the larvae from jar to jar. This part of the process has already proven commercially practicable and to this point the plan left nothing to be desired.

After building our cultures up to the setting stage, the large setting tank had been put in operation and about the first of August, almost half a million larvae were transferred to this tank. For four days we were so busy making adjustments to get everything working smoothly, there was no time to test the water to see how the forms were doing. Everything looked so natural we had little fear and awaited a moment of leisure to make the examination. To our great disappointment we found no larvae in the water at all. By drawing samples from the bottom we learned their fate. They were there motionless. Many were dead, only the shells remaining but those which were alive showed no activity.

It is difficult to picture the difficulty of working with animals so small that they can only be seen under the microscope and then only when those in a large volume of water are concentrated in a drop. When they disappear so many things could have been the cause. A thousand things must be right and only one needs to be wrong. In fact, the greatest value of this means of experiment lies in the relatively greater control we have over the conditions. However, in this case so many changes had been made we could not at once determine the real cause of the trouble. During the remainder of the season a series of experiments on different combinations were carried out to obtain sufficient data by which to correct the design of the setting tanks. It was not possible to make the necessary changes this season, but with the experience so gained the Commission feels confident that next year the full and complete demonstration of the process will be achieved.

The final hatching work of the season was to follow through the late spawn so as to learn how long set could be secured. The last spawn was taken on August 20th and some of this had not reached setting size on the 1st of October when it was necessary to cease operation. The month of September was quite cool and unfavorable, the temperature of the jars falling sometimes as low as 60° F. While this retarded development, it did not seem to injure the larvae which appeared healthy and quite as active as at higher temperatures. It, therefore, seems probable that a hatchery can depend on taking spawn from the middle of June until the middle of August and perhaps longer.

These results of operation of an experimental hatchery warrant the following conclusions:

1. An experimental hatchery designed to produce a million seed per season was built and mechanically operated.
2. The commercial production of larvae in jars by centrifugal principles of separation to the stage at which they can be separated by screens was successfully demonstrated.
3. The mechanical operation of screens with continuous flow through large tanks proved practicable, but the materials used prevented the development of the larvae.
4. Experiments on the effect of various materials show that other screens may be adapted which will not inhibit the growth of the larvae and demonstrate that with corrections in design oysters may be propagated in commercial quantities.

Other Shellfish.— Early in the season clams were successfully spawned and the larvae developed normally for several days.

The Commission was not prepared at the time to carry them further and special problems had soon to give way to the demands of the regular work. Toward the end of the season, however, a few bivalve larvae found their way into the hatching jars, in the course of experiments on the rate of clarifying water, and these were permitted to develop with the oyster larvae. Several reached the setting stage, proving that the propagation of other shellfish can be conducted the same as oysters. One form just previous to setting, with a large active foot similar to that of the oyster, was identified as Anomia.

Variability and Breeding.— Selective breeding, the most fruitful discovery of agriculture, becomes at once possible with artificial propagation. Domestication is the product of breeding from favorable varieties. The question naturally arises — what evidence, apart from experience with all other animals and plants, encourages the hope that improved shellfish varieties may be developed? The answer must prove first that variation actually does occur from which to select parent breeding stock. Nothing is more familiar to the epicure than the menu list of famous oysters — blue points, Rockaways, Cape Cods, Lynn Havens, Saddle Rocks, etc. Each is characteristic of some esteemed quality not generally recognized. Perhaps it will be contended that today these are merely trade names associated with size, but back of each lies a history of discriminating choice representing appealing variations from the average. More difficult is it to show that such characteristics do not arise from the nature of the ground — that these variations arise principally from the environment. Present methods of transplanting seed from various setting beds, of course, tend to emphasize this fact. However, the industry has long recognized a difference in the seed from various localities and reflects its preference by the very convincing argument of market price. In general it prefers northern seed which seems to prosper if moved into warmer waters, just as do seed potatoes from Maine the first season on Long Island, and even a second season if shipped to Bermuda. ''Lea side seed'' from the prolific beds along the ocean's edge has proved worthless when transplanted to cultivated beds, and there is a distinct prejudice among local growers to Great South Bay and Barnegat seed. Growers today are willing to plant whatever they can get, but in the days when Long Island Sound produced seed in abundance, none other held a place in the market. East River seed, as it was called, because the planting industry originated at that end of the Sound, held precedence over all other, as the records of Ingersoll and other historians of the industry so plainly bear witness. Today a bushel of seed from the famous Bridgeport beds will command double the price of Delaware or Chesapeake seed.

However convincing such arguments may be to the planter, the scientist will ask for ''scientific'' evidence of variation. For the want of sufficient scientific investigation, such records have been obtained incidentally. Careful measurements of larvae at the time of setting have established the fact that in Long Island Sound they reach a diameter of .32 mm. as compared with .28 mm. in Great South Bay, Barnegat, and Chesapeake. This was first pointed out by Gutsell of the U. S. Bureau of Fisheries, but our own observations fully confirm the measurements. Stafford in Canada found larvae there reached a diameter of .37 mm. and these figures were confirmed by Julius Nelson who also worked at Barnegat. There can be no question as to variation such as biologists hold to be of profound significance.

During the experiments on growth, further evidence has been obtained which shows the variation in growth of oysters born at the same time, in the same place and grown under identical conditions. The largest of fifteen oysters three and a half years old weighed 195 grams in November, 1924, when the smallest weighed 101 grams — just a little over one-half as much. The five largest averaged 160 grams — the medium five 129 grams, and the smallest five, 104 grams. It will be observed that the smaller oysters this year have not grown so much as the larger ones had last year. Growers well know the difference in rate of growth of oysters, but their different positions would normally account for this. The figures given here, however, relate to oysters collected on the same cup at the same time and kept in a tray where they were often taken out and replaced, thus insuring absolutely similar conditions of growth. Varied stocks of oysters were bedded in Great South Bay from which the spawn was derived but no other selection took place. Sufficient evidence of variation among oysters appears to exist to justify the anticipation of improved varieties by selective breeding.

Shellfish Purification.— The Inwood plant for purifying shellfish described in the 1922 report is now completing its third year of successful operation. The development of this process has saved to cultivation some of the most fertile areas on the Atlantic coast. Its significance is far broader than this, however, as it marks a new era in shellfish culture, for in general the finest fattening beds lie under waters which derive their fertility from the river valleys and here conditions are such as to require sanitary precautions before marketing the product. While scarcity of seed has caused the abandonment of ground and naturally questionable areas yielded first, the industry is beginning to realize the undeniable fact that it is the best ground which has been lost. Until methods similar to those developed in water and milk supplies were available, little help could be found. Now that a simple and efficient process has been demonstrated by the Commission and proven its practicability by long service, a great deal of interest is shown by growers and officials in its future possibilities.

The immediate prospect of rapid extension of the process now concerns the Commission, not because of any question of its efficiency, which is conceded by all who have become familiar with it, but because of the administrative problems which would arise with the establishment of numerous plants. While only one plant is operating, it is possible to give it closer supervision and so insure its responsible application without any extra provision by the State. This has fortunately prevented any criticism of the product which might be misinterpreted in its early stages as reflecting on the efficiency of the plant itself. Thus, in the past the Commission has borne a large share of responsibility which now that the efficiency of the process is fully demonstrated has been more and more shifted to the owners as provided in the law. Certain health authorities have questioned the wisdom of dividing this responsibility believing that the State should be accountable for the complete supervision of operation, particularly if the practice becomes general. At present there is no provision in the law applying to this new development in the industry, nor does the Commission find any reason for considering the form of supervision as provided unsound in the light of established precedent drawn from the regulation of water and milk plants. With a view toward the future, with possible or probable changes in the situation, it may sometime be desirable to reopen a question which up to now has been solved in a most satisfactory manner, and confer again with authorities concerned with the marketing of shellfish who perhaps are not aware of the arguments which brought about the present arrangements. In order to be prepared with every fact and circumstance connected with the actual operation of the plant for three years, a thorough investigation has been conducted this year. In general it has been found that efficiency higher than shown on original tests is attainable with greater experience, that the control has been thoroughly mastered and proves as simple as the operation of an automobile, and the tests on operation show the product to far surpass existing sanitary standards. With the issuance of a certificate on the product meeting these requirements as described in the annual report for 1922, a sufficient guarantee of sanitary quality appears to be provided.

Summary.— The Conservation Commission has established a station for experimental shellfish culture on Long Island by locating and testing an experimental sea farm near Glen Cove and by equipping and operating an experimental shellfish hatchery at Bayville Bridge.

A yield greater than one bushel of seed oysters per gallon of set detached from surface representing one square foot of collector plate was obtained by six months' growth on the experimental bed — thus demonstrating the practicability of intensive set collection.

The development of commercial quantities of larvae through the first half of their larval growth, together with experiments on large tanks and tests on materials suited to use, give immediate promise of a practical artificial method of propagating oysters.

Experience indicates that similar shellfish may be propagated by the same method.

Variability among oysters is shown to exist and offers a basis for the selective breeding of improved varieties.

Completing the Program.— The results obtained this year give satisfactory evidence of the soundness of the program outlined in last year's report and promise to establish a commercial method of artificial propagation if equal progress is made next year. To do this effectively will require an appropriation to provide for maintenance of the hatchery and slight alterations in equipment, and for assistance in operation.

DIVISION OF LANDS AND FORESTS

DIVISION OF LANDS AND FORESTS

Clifford R. Pettis	*Superintendent of State Forests*
William G. Howard	*Assistant Superintendent of State Forests*
Arthur B. Strough	*Land Clerk*
Albert H. King	*Forester*
Arthur S. Hopkins	*Forester*
Kinne F. Williams	*Forester*
Albert T. Davis	*Forester*
William D. Mullholland	*Forester*
William M. Foss	*Forester*
Elmer M. Merrill	*Surveyor*
Lawrence McGrath	*Examiner of Forest Land*
Arthur F. Amadon	*Blister Rust Supervisor*
Harlan H. York	*Forest Pathologist*
Henry L. McIntyre	*Supervisor of Gipsy Moth Control*
Ernest F. Lewis	*General Foreman of Nurseries*
Edward G. West	*Forest Surveyor and Draftsman*

DIVISION OF LANDS AND FORESTS

The work of the Division of Lands and Forests for the calendar year 1924 shows a marked increase in practically all of the activities, particularly in reforestation.

The Forest Preserve has been held practically intact. Trespasses have been reduced to a new low minimum. A very small area has been damaged by fires and more land has been added through purchase. The forest fire damage was below normal throughout the State up to the middle of October, when a new record had been made in reducing the area of forests burned. Owing to the prolonged drought, there were a great number of fires during the last few weeks of the fall season, which burned over a large acreage but the average damage caused by these fires is unusually small, for the reason that the fires spread rapidly and only burned dry leaves. On account of the danger, Governor Smith issued a proclamation closing the hunting season in the fire towns of the Catskills and Adirondacks.

The recreational use of the State lands has greatly increased. A careful study has been given to sanitary conditions and the development of larger areas through the erection and improvement of trails, and addition to the number of open camps.

The work covered during the last two years indicates that the control of the gipsy moth appears probable. This is very encouraging. Blister rust eradication has been diligently pushed with the result that there has been an increase of about 250 per cent in actual eradication and control in area over that obtained last year. Studies are being made in regard to means and methods for the control of the white pine weevil.

Reforesting has greatly increased again this year over other years and a foundation has been laid which is going to be of great importance in the forest policy of the State in relation thereto. Educational work in connection with the affairs of this division has been conducted. There has been an enormous request for publications which have been distributed as far as possible. The amount of mail, pertaining to various phases of the work of the division, has been unusually great.

The Forest Preserve

This great playground and protective forest, so near the center of the population of the east, has been almost completely protected from fire and trespass reduced to almost a minimum; title to various parcels, when questioned, have been defended by the Attorney-General, occupancy of State land has been reduced; the area has been increased through purchase.

Acquisition.— The Attorney-General has approved the title to 12,295.32 acres of additional land during the year. Contracts have been made for the purchase of a few parcels but purchases have not been made as extensively as heretofore, because our efforts have been directed to cleaning up pending cases where appropriations have been made and claims for damages have been filed in the Court of Claims. There is a small balance of funds left under the bond issue authorized in 1916 for the purchase of land and this money has been held in reserve largely for the purpose of being used as some emergency may develop. There will be available under the new bond issue, authorized by the people at the November election, the sum of $5,000,000 in addition for the purposes of purchasing land and increasing the area of the Forest Preserve. This money will not all be available at one time but the Legislature, at different sessions, will authorize the issuance of bonds as it deems necessary.

Trespass.— There were but seven cases of trespass reported as committed during the year. The Rangers have been very diligent in looking after the State land and this is an excellent showing. In only one case was there an attempt at what might be considered a deliberate trespass upon State land and in this instance, wood valued at $64.64 was cut for which the party responsible paid in a penalty of $323.20 and the wood which was cut was confiscated by the Conservation Commission and sold and the proceeds placed in the State Treasury. Therefore, the party was not only penalized $323.20 but he lost all his labor in cutting and hauling, etc., of the wood. In one case a road was cut where the damage was nominal and the trespasser paid $21. In three cases the trespasses were the result of disputed lines. In these instances only $39.95 worth of timber was cut but twice the value was recovered. In two cases, dead or down trees having but a nominal value were removed but penalties of $10 in each case were collected. The fact that but seven cases were reported as committed during the year sets a new mark as does the small damage of $104.59 for which a recovery of $444.10 was received.

Occupancy.— Efforts have been put forth during the year, both by this Commission and by the Attorney-General's office, to have the necessary determination made as to occupancy of State land and obtain the discontinuance thereof. There are now in the office of the Attorney-General, eighty-eight cases pending trial, eleven of which can hardly be classed as occupancy but rather adverse claims of title. There are thirty-one cases in the office of this Commission awaiting surveys or other kinds of investigation. It will develop, after surveys are made, that some of these are not occupancies. The ranger force has been instructed to diligently proceed with the examination of State land and in case there is question as to whether or not an occupancy exists to report the same as such that this matter may be fully investigated. Since the question of occupancy and effort to obtain a discontinuance of the illegal use of the Preserve in 1916, the use of State land has decreased from approximately 1,000 cases to about 100. Practically all of the larger cases have ceased and those remaining are of trivial character or where the question of title is involved.

Forest Preserve Area.— The area of the Forest Preserve has been increased through purchase, and decreased through judgments against the State with regard to title. The area on January 1, 1925, was as follows:

Forest Preserve Area

January 1, 1925

			Acres
Adirondack Preserve:			
Area January 1, 1924			1,847,193.18
Acquisitions:			
Purchases	11,228.17		
Original State land located	660.78		
		11,888.95	
Losses:			
Judgments against State	3,802.10		
Reclassification	51.80		
Resurvey	67.10		
		3,921.00	
Net gain			7,967.95
Area January 1, 1925			1,855,161.13
Catskill Preserve:			
Area January 1, 1924			146,835.18
Acquisitions:			
Purchases		1,067.15	
Losses:			
Redemptions and cancellations of Tax Sales		177.00	
Net gain			890.15
Area January 1, 1925			147,725.33

Summary

Adirondack Preserve	1,855,161.13
Catskill Preserve	147,725.33
Total	2,002,886.46

In the Adirondacks, where 3,475.1 acres of land had been purchased it was found as a result of an action in court, that no title had been acquired by the State, recovery of the purchase price, interest and taxes were obtained. The title to 327 acres which the State held under tax deeds was found by the Court's determination to be void. As a result of surveys in three cases, it was found that the State had 67.1 acres less than was supposed.

By reclassification of the land, it was determined that 51.8 acres of land which the State owned was not a part of the Forest Preserve. The area of the Catskill Preserves was reduced by 177 acres on account of redemption granted by the State Comptroller of lands acquired in the 1920 tax sale.

List of Acquisitions.—Pursuant to law, the following list of lands acquired during the year 1924 is submitted. Title to all these properties has been obtained through purchase or appropriation and all title thereto approved by the Attorney General.

Adirondack Preserve

Essex County

Old Military Tract

Townships 1 and 2

Richards' Survey

	Acres
Lot 66, Ex. 39a, N. E. cor. square	729.50

Township 11

Lot 119	160.00

Township 12

Richards' Survey

Lot 2, sub. 1, N. W. ¼	41.00
Lot 15	696.00
Lot 24, Sub. 1, N. W. ¼ and S. E. ¼	82.00
Lot 24, Sub 4, E. ½ and S. W. ¼	102.65

Thorn's Survey

Lot 142, N. E. ¼	40.00

Paradox Tract

Lot 105	144.40

Roaring Brook Tract

Lot 60	260.00

Franklin County

Macomb's Purchase

GREAT TRACT 1

Township 12

Lot 28, E'ly part	151.62
Lot 38, Ex. 100a. N. end	504.00

HAMILTON COUNTY

Arthurboro Patent

South Half

Morehouse 8,000 Acre Tract

Lot 36, N. end	13.00
Lot 37, N. end	26.00
Lot 38, N. end	64.00

HERKIMER COUNTY

Macomb's Purchase

GREAT TRACT 4

Triangle in Easterly End

East end	1,459.00

ST. LAWRENCE COUNTY

Macomb's Purchase

GREAT TRACT 3

Township 14

South west ¼

East end	5,143.00

WARREN COUNTY

Dartmouth Patent

GREAT TRACT

Range 7

Lot 12	234.00

Islands in Lake George

Turtle Island	14.00

North West Bay Tract

Lot 127, All E'ly of Beaver Brook	20.00

Tongue Mountain Tract

Lots 7 & 8, Easterly ends	268.00

Totten & Crossfield Purchase

Township 14

POND'S SURVEY

Lot 29, All in Chester	4.00
Lot 44, All in Chester	72.00

Catskill Preserve

GREENE COUNTY

Hardenburgh Patent

GREAT LOT 26

Division 5

Lot 1	136.95
Lot 2	138.36

ULSTER COUNTY

Hardenburgh Patent

GREAT LOT 7

Allotment South of Bushkill

Lot 2, Lily Sherman parcel	143.60

GREAT LOT 8

Livingston or Sherwood Tract

Lots 1 & 2, Cluett parcel	105.00

GREAT LOT 26

Division 3

West end of all in Ulster Co.	543.24

SUMMARY

Adirondack Preserve	11,228.17
Catskill Preserve	1,067.15
Total	12,295.32 acres

St. Lawrence Reservation

The various parcels of State land, including this reservation, have been extensively used during the past season. The work which the Commission has done during the last two or three years in repairs and improvements has been appreciated. Additional land has been cleared and the accommodations increased. The completion of the State highway has made greater use possible. The parks, at certain times, have been used to their full capacity and there is now a demand for the purchase of additional park areas along the river on the main shore.

Cuba Reservation

On May 1st, last, new leases, usually for a period of five years, were made for lots on this reservation. Two hundred and forty such leases were made.

There has been a very general improvement throughout this reservation during the past few years. In the first place, the sanitary requirements have been met. The older cottages, generally speaking, have been rebuilt and improved; the surroundings of the lake made much more attractive. The local authorities have built an improved road around a portion of the lake and this has very greatly increased the use of the park.

John Brown Farm

Through the Council of Parks, an assignment of money was obtained for the erection at John Brown farm of a caretaker's cottage, which is now practically completed. Upon the farm is the old John Brown homestead. The house is very old and is hardly habitable during the winter season. The plan for development at the John Brown farm contemplates the caretaker living in the new cottage which will permit the removal of additions to the former John Brown house which were added in order to furnish quarters for the caretaker. We hope to restore the house to its original condition and by means of new roads facilitate traffic and make accommodations easier for the ever increasing number of visitors at this place.

Lake George Park

The general agitation which has taken place during the last two years for a Lake George Park has resulted in two appropriations of $75,000 each being made during 1923 and 1924 for the use of the Conservation Commission in purchasing additional land. The first purchase was Turtle Island, the title to which passed to the State during the year. One parcel of land was acquired on the westerly side of Tongue Mountain above North West Bay. Contracts have been made to acquire slightly over 7,000 acres of land upon the Tongue Mountain range. Additional lands have been inspected and negotiations for their acquisition is in progress. It is considered that acquisition of the Tongue Mountain tract generally, and of sufficient land for proper approaches thereto, is one of the necessary developments in connection with the Lake George Park.

RECREATIONAL DEVELOPMENT

It has been difficult to keep pace with the public demand for additional public camp sites. The camp sites which have been established are used constantly throughout the camping season, and the number of fireplaces is altogether inadequate for the people who want to use them.

Following the inspection of our public camp sites made in the fall of 1923, the Commission this year planned to place first emphasis on providing those camp sites with proper sanitary facilities and adequate supplies of good drinking water. The study of these problems brought out more forcibly than ever before the necessity of concentrating on large camp sites with several fireplaces instead of many small camp sites containing only one or two fireplaces.

When we can get our camp sites large enough to warrant assigning a special officer to take charge of each site to police it, to allot the various camp fireplaces in a fair and tactful manner, it is going to be possible to make these sites much more attractive.

The largest camp site at present developed is just south of Wells, Hamilton county. A suitable spring was found to provide drinking water for this camp site and a pipe laid which brings

Scene along Ferndell Brook in Geyser Park, State Reservation, Saratoga Springs.

the water from this spring to the lower end of the camp site. The Wells camp site has also been enlarged during the past season by the erection of six new fireplaces.

For several years a public camp site, consisting of one fireplace, has been maintained at the so-called Sharp Bridge on the State road between Schroon Lake and Elizabethtown. An examination of this site indicated that it has possibilities for indefinite extension, so early in the season of 1924 we proceeded to erect 10 additional fireplaces. We provided suitable sanitary facilities and by piping a spring from a point 800 feet distant up the mountainside have furnished a supply of excellent drinking water which is entirely adequate for the camp site.

This camp at Sharp Bridge is one of the most attractive which the Commission has yet established, because located as it is in pine woods, the natural conditions have lent themselves to a plan of partial seclusion for each fireplace and tenting space. While there are now facilities for 10 camping parties, each of these parties can have more or less privacy by screens of brush and trees which have been left standing between the fireplaces.

The camp site at the Boreas Bridge on the State road between North Creek and Newcomb has been enlarged by the construction of additional fireplaces and piping springwater to the camp site.

At the Lewey Lake Bridge on the west side of Indian Lake the old camp site has been considerably enlarged, brush cleared away from a most attractive camping section near the lake shore and additional toilet facilities provided. Six new fireplaces were added on this area.

Several additional fireplaces were constructed at the camp site in the Wilmington Notch, which is one of the most popular maintained by the Commission.

Two new camp sites were established in this region, one between Lake Placid and Wilmington Notch, and one between Saranac Lake and Lake Placid.

Maintenance of existing camp sites requires a great deal of work, because the fireplaces are constantly in need of repairs, fire notices must be posted and replaced as they become shabby and signs must be put up and kept in good condition. Also, it frequently happens that some careless camper goes away from a camp site leaving it in an untidy condition. It is not always possible to fix the responsibility for a condition of this sort and this means that the cleanup work must be done by the men of our own force in addition to their other work. In one case, during the past season, the person responsible for leaving a camp site in a filthy condition was apprehended and fined.

No new trails have been opened by the Conservation Commission during the season of 1924, but it has been necessary to clear out debris accumulated during the past winter from 350 miles of old trails which have been opened and marked by the Commission and the maintenance of which is a duty which cannot be neglected. Once a trail is opened up it must be kept up, because we want the standard Conservation Commission trail markers to stand for a good safe trail.

Three open camps have been built during the 1924 season. Only one of these, namely, the one located at Calamity Dam on the shore of the Flowed Lands, is new. The other two are replacements of old camps destroyed by fire. In the case of one of these camps, it was possible to fix responsibilities for the fire, and the persons responsible paid the cost of replacing the camp.

It is unnecessary to reiterate that the public has appreciated the camping facilities provided. At the Winter Carnival held at Saranac Lake in January, 1924, the Commission entered a float which showed a small open camp and fireplace with appropriate equipment. This exhibit was received with great favor.

The following table contains a summary of the recreational development carried on in the five districts of the Adirondack and Catskill regions during 1924:

SUMMARY OF CAMP AND TRAIL CONSTRUCTION

DISTRICTS	Miles of trail cleared	Number of open camps built	Number of fireplaces built	Number of water supplies installed
1	62	....	22	1
2	180	1	11	2
3	12	....	....	....
4	27	....	12	1
5	69	....	1	....
Totals	350	1	46	4

Use of Signs and Billboards Restricted

During the last few years the use of signs of various kinds and the erection of large billboards has greatly increased generally throughout the country. Their erection has done a great deal to detract from the natural beauty of the country in which they are placed; in some places they are so thickly placed that their value for advertising purposes is practically nothing; in many instances they are so worded that they have a very great influence in decreasing the value of necessary danger signs along the public road; in some instances they are erected so that they hide the natural vision of the highway and thus make travel more dangerous.

Chapter 512 of the Laws of 1924, which added a new section, known as 61-a, to the Conservation Law, became effective this year and reads as follows:

> "In order to conserve the natural beauty of the Adirondack park by preserving and regulating it for public uses for the resort of the public for recreation, pleasure, air, light and enjoyment by keeping it open, clean and in good order for the welfare of society, and to abate the public nuisance which has arisen through the unrestricted use of signs and billboards

Walks in the Vale of Springs, Saratoga Reservation, showing waterfall under stone walk.

> therein, no person shall erect or maintain within the boundaries thereof any advertising sign or billboard, except under written permit from the commission. The provisions of this section shall not apply to signs erected or maintained upon property in connection with a business conducted thereon, or within the limits of an incorporated village.''

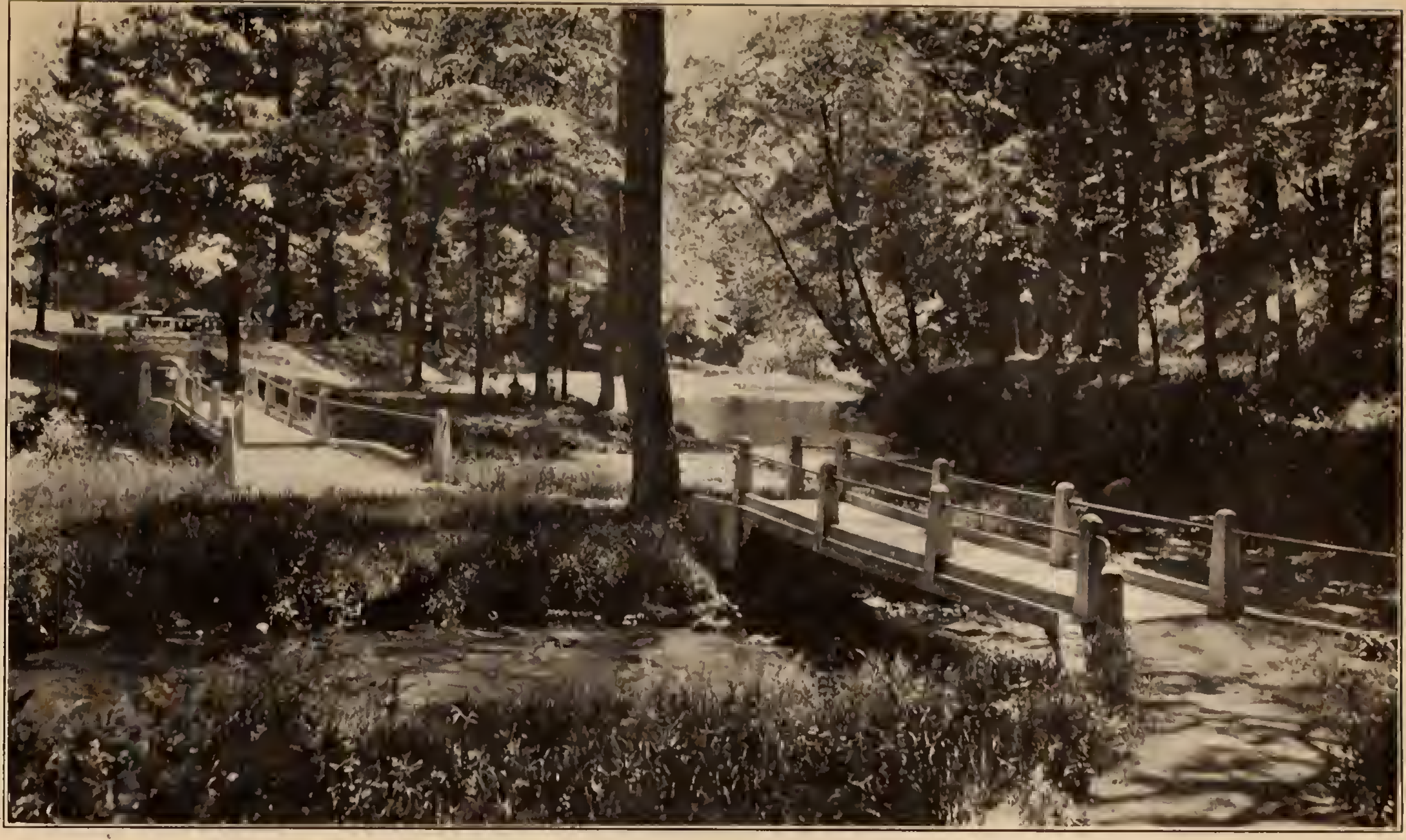
This law applies only to that portion of the State situated in the Adirondack Park, an area of about three and one-third million acres, and the enactment is predicated upon the conservation of the natural beauty and the regulation of the use of the property and to abate public nuisance. The law does not apply to signs erected or maintained within the limits of an incorporated village nor to signs erected or maintained in the immediate vicinity on the property of a business thereon conducted.

The first step which the Conservation Commission took in this matter was to obtain an inventory of the signs in the Adirondack Park and it was found that there were in the neighborhood of two thousand signs, large and small of various kinds. After the inventory had been completed, the Forest Rangers were instructed to have personal interviews with the owners of the signs, explain to them the law, and see if the owners would not remove the signs themselves or authorize the Rangers so to do. As a result, we have received reports of the removal of 1,332 signs by the Rangers and of 89 signs which have been removed by the owners themselves. In addition thereto, there are 55 signs which the owners have agreed to remove, of which the Commission has not yet received final reports. There are many other small signs of a temporary character which were removed, of which no report was made. There are about 100 signs which are more or less of a directional character, the disposition of which has not yet been decided upon. There are some signs which are large and valuable to which the owners object to removal. The Commission is now in correspondence with these owners in an endeavor to get their cooperation for the removal thereof. No permits have been granted for the erection of any signs. There has been general cooperation with the owners for removal of these signs and only in a few cases is there substantial objection. The removal of the signs has resulted in a great deal of commendation on account of the improved scenic effects.

REFORESTING

Inasmuch as this year marks the end of a quarter of a century since the real beginning of reforestation by the State in the Adirondacks in 1899, it seems appropriate to say a few words as to what has been accomplished during this period.

The first plantation was made by the State at Axton, in Franklin county, in the spring of 1899 when about forty acres of barren land were planted and a small nursery was established there that year. In 1901 the Forest, Fish and Game Commission established a small hardwood nursery at Brown Station in Ulster county. The



Coesa Creek and concrete bridges leading to picnic grounds, Geyser Park, State Reservation, Saratoga Springs immediate result of the planting at Axton and also in the Catskills was that the State authorities and many people became very much interested in reforestation. A large plantation was made by the State in 1902 when 600,000 trees were planted on the Forest Preserve in the vicinity of Lake Clear Junction in Franklin county. These plantations have been very successful and have resulted in demonstrating what can be done in the way of reclaiming poor, barren, worn-out land and placing it under a productive crop.

At that time it was impossible to obtain in the market small trees in large quantities for reforesting purposes. As a matter of fact, it was almost impossible to purchase tree seeds. One of the Commission's foresters, in the fall of 1902, collected a large quantity of Adirondack spruce seed and some other species and in the spring of 1903, the beginning of the present nursery system, took on tangible form by the establishment at Saranac Inn of the first real forest tree nursery in the State. It took a few years to get started and, of course, it took three years to produce a three-year-old tree. The first planted stock from this nursery was developed and sent to the field in 1905. It might be added that at this and other nurseries of the Commission has been developed a system of nursery practice which has been generally adopted throughout the country.

Scotch pine plantation north of Paul Smith's. Planted in 1905, being ininspected by the Farm Bureau Reforesting Survey.

A legislative committee was then in the habit of making a trip through the Adirondacks each summer and in 1907 visited the nurseries and plantations at Saranac Inn and Lake Clear Junction. The members became deeply interested in reforesting work and decided that the nurseries should be increased in size, more land should be planted and assistance should be given to private owners in the way of furnishing them proper trees at cost of production. A law embodying these principles was passed in the spring of 1908.

The result was that during the spring of 1908 there were seven sales of trees aggregating 25,000. In 1909 there were 179 sales aggregating 1,005,325 and more orders could have been filled if the supply of stock had been sufficient. Comparing the small beginning with the fact that during the past year, 1,489 shipments aggregating 9,247,090 trees were made from the Commission's nurseries, it is easy to see what wonderful strides have been made in the past twenty-five years.

This demand for trees necessitated the establishment from time to time of additional nurseries and increasing the output of those already in use. There has been developed at Saratoga Springs what is the largest forest nursery in America. In a short time the nursery at Lowville will be as large and a nursery nearly as large is under development at Lake Clear Junction. Even with these various nurseries, the Commission is unable to supply all of the orders. Plans have to be made in advance because it requires from two to three years to grow planting stock large enough to distribute, which means establishing another nursery.

When the report was made last year, these nurseries were supposed to contain 25,018,600 trees, and, although the nurseries have been taxed to their limit during the past year and a quantity of two-year-old trees have been substituted for larger size, the inventory at the present writing shows an increase to 41,016,000 trees. If necessary appropriations can be obtained, the output of the nurseries will be further increased and one or two additional nurseries established.

There are upwards of 4,000,000 acres of idle, non-productive land in this State which is suitable only for the growing of timber. There is already a scarcity of timber. Our industries are increasing the demand on our forest resources. It is, therefore, imperative, as an economical and industrial measure for this State to greatly increase the steps which it has only begun in the reclamation of this vast area in order to produce material of which wood is the basis for our civilization and industries. The production of wood is a necessity and a benefit to all the people no matter what their interest.

During the past there has been a great deal of talk about reforestation but no one will dispute, after examination of the above figures, that New York has already made a very conspicuous beginning. We have now reached a period in the development of this project where various organizations are becoming actively engaged in its support.

Farm Bureau Organization.—As a result of the reforestation conference called by this Commission two years ago, Farm Bureau agents of the State became very much interested in reforesting. One of their problems is crop production on these poor lands. During the past two years more than 1,000,000 trees have been donated by the Conservation Commission to the Farm Bureau agents for the purpose of making demonstration plantations in the State. This, coupled with the problem which they have and the observation of the growth of many plantations made throughout the State, resulted in a three-day special Farm Bureau excursion on reforestation. The nursery at Saratoga was studied where were found transplants and seedlings of various kinds and the agents given an opportunity to ask questions. They were shown thousands of acres of private plantations in Saratoga county and the extended plantations of the city of Glens Falls on the water works, natural growth and white pine plantations in Warren county, and they then examined thousands of acres of plantations of white pine, red pine, Scotch pine, Norway spruce on State land in the Forest Preserve in the vicinity of Lake Placid, Saranac Lake and Paul Smiths. They also visited the first plantation made by the State at Axton. This trip so deeply impressed the agents and the Exten-

Boy Scouts on the way to aid in planting the Women's Federation Forest.

sion Department of the State College of Agriculture that they have asked that arrangements be made for a longer trip next year.

It has resulted in many counties in the appointment of a forestry committee and active steps are being taken to correlate the forestry work in a county. There is also contemplated local trips to view the results of reforestation in one or more counties in various parts of the State. These may be called sectional tours. The Farm Bureau agents have asked for assistance in the extension work through the schools, at fairs and at their meetings. They are also planning to start county forests through the acquisition of idle lands by the county and obtaining the trees and making plantations which will be owned by the county. They have similar plans in regard to town forests.

Reforesting Picnics.— During the past three years basket picnics have been held at various places where there were several year-old plantations. The purpose was to demonstrate to those assembled the possibilities of reforesting. This method seems to be the most practical method of driving home to the land owner what can be done. A gathering of this kind affords an opportunity for making exhibits of small trees, methods of planting, and general discussions. The plantations are examined by small groups in charge of a person who is able to explain the plan pursued in reforesting. A picnic of this kind was held on Charles DuMond's farm in Delaware county last August, which was attended by about eighteen hundred people.

Avenue of Pines, State Reservation, Saratoga Springs.

Fish and Game Clubs Cooperating.— The sportsmen of the State realize that in order to have fish and game in reasonable quantity that it is essential that they have forests as a home for game and as a protection for the headwaters of our streams. There are a great number of sportsmen's clubs in the State that are buying trees and giving them away to farmers to plant on their own lands to accomplish this purpose. The Broome County Sportsmen's Association developed twenty school district forests this last year. Some of the sportsmen's clubs are buying land and planting it as a recreational field for their own use and as an investment for the club.

Women's Clubs.— The State Federation of Women's Clubs had their annual meeting in Albany last winter and authorized their conservation committee to acquire a suitable tract of land and start a forest which will become an endowment for the State Federation. A tract of 100 acres of land has been purchased in Saratoga county, and nearly one-third of it has, through cooperation of the Farm Bureau, Boy Scouts, Conservation Commission and State Forestry Association, working in conjunction with the State Federation of Women's Clubs, already been planted. The remainder will be planted in the spring of 1925.

Publicity.—A vast amount of work has been done by the Conservation Commission through newspaper publications which have been distributed to the publishers through the State, giving news information in regard to the growth of the reforesting work during very short intervals. A great many addresses have been given before organizations which would insure a reasonable audience of interested people and many talks have been given by radio and otherwise on this subject. The result is that there has been an enormous amount of mail and inquiries in regard to reforestation, the result of which is reflected in the foregoing progressive statement of the increase in the distribution of trees.

Tree Planting Indicator.—A great many people want to plant trees but feel timid about making a selection. Therefore, the Commission has prepared a "tree planting indicator" which consists of a card upon which there is a movable circle fastened at the center. Every person who wants to reforest must take into consideration first, the kind of land which he has which is to be used for that purpose. This is a fixed factor which he cannot change. The various kinds of soils are indicated at the top of the indicator. He can select the kind of material that he wants to grow, whether it be saw timber, pulpwood or rough wood, which is used for posts, poles or ties. Therefore, the forest product desired being a variable factor, is marked on the revolving disk. The prospective planter turns the arrow, indicating the kind of forest product which he wants to grow, around so that it will point to the kind of soil which he has. He then reads the numbers opposite the star on the lower part of the revolving disk and by use of a legend, these numbers indicate species of trees which can be planted upon this kind of soil successfully and produce the desired material. It is expected that the tree indicator will be issued in large quantity and that the land owner will be able to make his own decision as to what kind of trees to use upon the soil which he has. It will save him writing letters and will save the office a great deal of correspondence.

It is believed that its use will greatly advertise reforestation and do much in interesting people generally in this project.

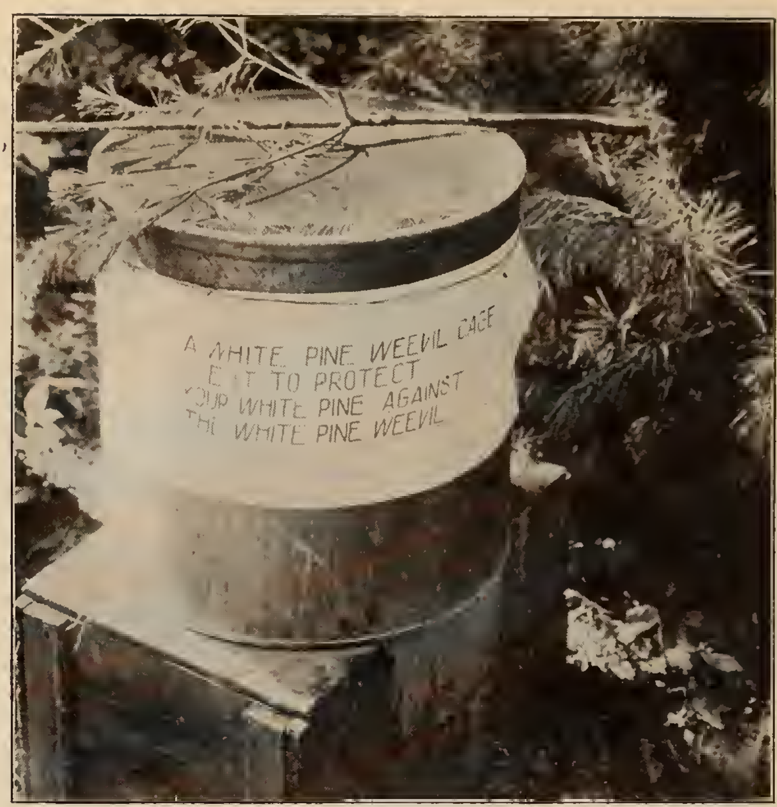
Forest Tree Distribution 1924.— The following table indicates the number of shipments and the quantity of trees classified according to various interests and ownerships.

TREE SEASON—1924

	SPRING		FALL		TOTAL	
	Number of orders	Number of trees	Number of orders	Number of trees	Number of orders	Number of trees
State institutions	21	347,050	1	3,000	22	350,050
Municipalities	71	1,221,700	4	24,500	75	1,246,200
Industrials	32	1,580,000	2	152,500	34	1,732,500
Demonstrations	445	626,990	7	6,300	452	633,290
School districts	11	37,200	1	300	12	37,500
Boy scouts	5	30,000	....	....	5	30,000
Private land owners	715	4,239,000	120	400,550	835	4,639,550
Miscellaneous	48	512,800	6	65,200	54	578,000
	1,348	8,594,740	141	652,350	1,489	9,247,090

It will be noted that municipalities obtained practically 1,500,000 trees. These were generally supplied for the planting upon lands acquired by cities and villages in connection with their water system. The city of Glens Falls made a large plantation this year. They had 200 acres added to their already large plantation. New York city planted about 170 acres; Little Falls, about 100 acres; Carthage, about 60 acres; Oneonta, about 50 acres; Rochester, about 70 acres; Greenwich, about 40 acres; Newark, about 25 acres; Ilion, about 25 acres; Gloversville, Malone and Salamanca each about 20 acres; Waverly, 13 acres; Warsaw, about 12 acres; Sherburne, about 7 acres; Kingston, about 15 acres; Canajoharie, about 11 acres; Binghamton, Canton, Dansville, Ithaca, Plattsburg, Utica, Watertown and Watervliet, each about 10 acres. A great many other villages and cities made smaller plantations. The industrial concerns, largely those interested in the production of lumber and pulpwood, planted approximately 1,333,000 trees. Private land owners planted over 4,500,000 trees. One individual land owner planted 1,250,000 trees. Eleven school district forests were established or existing ones increased.

Summary of Planting.— Since the beginning in 1902, there has been about 26,000 acres of State Forest Preserve reforested. About 6,400 acres of land owned by State institutions and about 45,000 acres of land owned by municipalities or private parties were reforested.



White pine weevil cage. Forestry Field Day, DuMond Farm, Delaware County.

Inventory.— The following is a list of the trees in the Commission's nurseries October 1, 1924:

White pine, 1-year seedlings	9,552,000
White pine, 2-year seedlings	2,049,000
White pine, 3-year transplant	744,000
Scotch pine, 1-year seedlings	6,112,000
Scotch pine, 2-year seedlings	1,555,000
Scotch pine, 3-year transplant	2,217,250
Red pine, 1-year seedlings	1,384,000
Red pine, 3-year transplants	56,150
Norway spruce, 1-year seedlings	10,512,000
Norway spruce, 2-year seedlings	2,796,000
Norway spruce, 3-year transplants	2,584,050
White spruce, 2-year seedlings	235,000
White spruce, 2-year transplants	2,519,450
White cedar, 1-year seedings	840,000
White cedar, 2-year seedlings	37,000
White cedar, 4-year transplants	20,000
European larch, 1-year seedlings	112,000

European larch, 2-year seedlings	3,000
Balsam fir, 2-year seedlings	3,000
Black locust, 1-year seedlings	150,000
Caroline poplar rooted cuttings, 1-year	30,000
White ash, 1-year seedlings	5,000
	41,016,000

Growth Studies.— During the months of July and August, the sample plot study of forest plantations begun last year in the Adirondack region, was continued in the central and western portions of the State, 83 permanent one-quarter-acre plots being established and intensively studied, which make a total of 152 plots now established as shown below:

County	*Number of Plots*
Cattaraugus	4
Chemung	4
Chenango	7
Cortland	4
Delaware	17
Erie	1
Fulton	4
Genesee	9
Greene	3
Herkimer	24
Jefferson	6
Lewis	25
Livingston	5
Madison	4
Oneida	14
Otsego	14
Steuben	2
Tompkins	1
Wayne	4
Total	152

The distribution by species of the plots is given in the following table:

Species	*Number of Plots*
White pine	43
Scotch pine	26
Red pine	14
Norway spruce	27
White cedar	5
White ash	4

Species	*Number of Plots*
Red oak	1
White oak	1
Black locust	1
Catalpa	1
Carolina poplar	1
Black walnut	1
Various mixtures	27
Total	152

In the course of the work nearly every plantation of any size over ten years old in the counties above mentioned was examined and studied in a less intensive manner. A majority of the owners of these plantations were interviewed and enthusiastic cooperation for the project given by all of them. This study has secured a large amount of information relating to the adaptability of various species to different sections and conditions, and will eventually furnish accurate figures on the growth and yield of planted forests in this State.

White Pine Weevil.— In some sections of the State the white pine, both natural and planted, is attacked by the white pine weevil, an insect which injures the tree by boring down through the top leader which causes the death of the main branch.

This results in some side branch usually turning up and to a certain extent replacing the main central branch. The result is that the trees are sometimes forked and other times have a crook. Studies are in progress to get more data as to the life history of this insect and practicable means of its control.

It is, however, felt that the weevil insect damage in many cases is overestimated and that while they cause an injury to some plantations which makes the trees grow crooked, on trees or plantations which have reached a commercial size the injury has been largely overcome. The great variety of uses of white pine, coupled with the fact that it is one of the rapid growers even on our sandy lands means that steps must be taken to protect it from this insect.

FOREST FIRE PREVENTION

The forest fire season of 1924 was remarkable in many ways. Dry weather outside of the mountain regions unusually early in the spring resulted in a number of fires in the Fire Districts. In the mountain regions, owing to the lateness of the spring, the bad fire hazard which usually comes about May 30 was delayed until about June 10 and did not last long even then, because the June foliage came along so rapidly and the summer rains were so continuous. Long Island suffered a record drought during July and the first third of August which resulted in an exceptionally large number of forest fires in that area for that time of year. Whereas serious fire danger on Long Island is confined usually to the spring months we had the worst fires this year in that section in August.

Of course, the outstanding feature of the whole year's fire weather was the drought which prevailed almost universally, not only throughout New York State but throughout the entire Northeast, during October and the first half of November. The lack of any rain or snow to amount to anything from September 30 to November 14, during the time when the trees were shedding their leaves, produced a most serious forest fire hazard, a remarkable condition because forest fires seldom occur in the Adirondacks after the first of November. During the last half of October the woods were filled with hunters and on the 26th and 27th of October several large forest fires and many small ones were started.

One of five field weather stations established this year in the Adirondacks in connection with fire protective work.

These fires, from their location and the places where they occurred, could only be attributed to hunters. For this reason, the Commission appealed to the Governor to exercise the authority conferred upon him by the Conservation Law to prohibit hunting and camping while the fire danger lasted. The Governor responded immediately to the appeal and on October 30 issued a proclamation prohibiting hunting and camping in the Fire Towns of the Adirondack and Catskill regions. While all realized that the danger was just as great in forests in other parts of the State, the proclamation under the Conservation Law had to be limited in its application to the Fire Towns. The Conservation Commission, however, broadcasted an appeal to sportsmen throughout the State to refrain from hunting in forests anywhere in the State during the extreme forest fire danger.

The text of the Governor's proclamation follows:

PROCLAMATION

STATE OF NEW YORK — EXECUTIVE CHAMBER

WHEREAS, Section fifty-four of the Conservation Law of the State of New York provides that whenever by reason of drought the forests of the State are in danger of fires which may be caused by hunters or campers, the Governor shall determine and declare that such pursuits are contrary to the public interest, and shall have authority to forbid by proclamation the carrying on of such pursuits within such fire towns as he deems the public interest requires; and

WHEREAS, An unusual period of dry weather with the ground covered with dry leaves has rendered the forest highly inflammable, resulting in a large number of fires which are destroying the forest domain of the State which is particularly endangered by fires caused by persons engaged in hunting and camping; and

WHEREAS, The present forest fire hazard is a matter of extreme gravity and concern to all the people of the State, and the preservation of our forests is of paramount importance for future recreation and the conservation of our forest resources, justifying the necessity of drastic action; and

WHEREAS, The Conservation Commissioner calls to my attention the need for immediate action,

NOW, THEREFORE, I, Alfred E. Smith, Governor of the State of New York, regretting the necessity of curtailing the pleasures of those who are enjoying the hunting season, but appreciating as I do the necessity of protecting the forests for the benefit of all the people of the State, do hereby determine and declare that the pursuits of hunting and camping are contrary to the public interest, and do hereby forbid any person or persons carrying on such pursuits in the fire towns of the counties of Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Oneida, St. Lawrence, Warren, Washington, Delaware, Greene, Sullivan and Ulster; and that the prohibition of this proclamation continue until revoked by executive order.

I HEREBY further determine that this proclamation shall be in full force and effect beginning October 31, 1924, and that notice of same shall be given through the public press.

[SEAL] GIVEN under my hand and the Privy Seal of the State, at the Capitol in the City of Albany, this thirtieth day of October in the year of our Lord Nineteen hundred and twenty-four.

(Signed) ALFRED E. SMITH,
Governor of the
State of New York.

By the Governor.
(Signed) GEORGE B. GRAVES,
Secretary to the Governor.

The authority of the Governor to exclude hunters from the woods on account of the fire danger has never before been invoked and the success of this action could not be foretold. The results, however, have been most satisfactory. The enforcement of the proclamation was assigned to the game protection force of the Conservation Commission, supplemented by a force of twenty-eight motor vehicle inspectors whose services were generously donated by the State Tax Department, and supplemented also by the Department of State Police which placed its entire force of men at the disposal of the Commission wherever such men might be needed to enforce the Governor's proclamation. The newspapers cooperated through the writing of strong editorials pointing out the forest fire danger and urging people to keep out of the woods. The radio companies broadcasted frequent fire warnings and also sent out the word when the Governor's proclamation went into effect.

No exact measure of the effectiveness of the proclamation in reducing forest fires can be obtained, but we do know that the number of fires in the areas where this proclamation was effective decreased in comparison with fires which occurred in other parts of the State.

The cooperation of hunters generally throughout the State was all that could be desired. Although many sportsmen had made plans far in advance for hunting trips and the proclamation came to them as a great disappointment, they observed it loyally, refraining from hunting even in localities where it might have been difficult to detect violations. There were, it is true, a few violations, but the offenders were promptly punished.

The long drought of the fall was relieved by a general rain and snow on November 14th, whereupon the proclamation was immediately revoked by executive order and the hunters had an opportunity to get into the woods for the last two days of the deer season.

Before discussing the work in forest fire control during the past season, it might be well to explain in a few words the system used. The Fire Towns of the Adirondack and Catskill regions are designated in the Conservation Law and embrace the entire area of the

Adirondack and Catskill parks, and in addition, the more densely forested portions of the mountain lands surrounding these parks. In fact, to express it in another way, the Fire Towns of the Adirondacks and Catskills embrace the entire Adirondack and Catskill areas.

In the Fire Towns we have an intensive system of forest fire control, with district rangers, forest rangers and fifty-four fire observation stations.

New fire tower on Hill No. 7, Rensselaer County.

The Fire Districts (as opposed to the Fire Towns) have been designated by the Conservation Commission in other parts of the State containing large bodies of forest land. The Fire Districts include:

1. Suffolk county, Long Island.
2. The area east of the Hudson river and south of the Adirondacks.
3. The area south of the Catskills to the New Jersey and Pennsylvania lines, and
4. The forest lands of the southwestern part of the State.

In the Fire Districts it has not been possible to establish as intensive a system of fire control as we have in the Fire Towns. We have, however, five district rangers, ten observation stations, but no forest rangers except as mentioned hereafter.

Adirondack and Catskill Fire Towns.— In the Fire Towns of the Adirondack and Catskill regions, a total of 484 fires was reported. This is a decrease of 13 per cent from the number of fires reported in 1923. The average area per fire in 1924 was 31 acres, as against 32 acres in 1923.

The fall fires, of which we had so many in 1924, burned very rapidly and were exceedingly hard to stop, although they did much less damage than that done by fires which occur in the spring or summer.

A summary of fires for the first part of the season prepared on July 20th showed remarkably low figures, as follows:

Type of forest fire truck installed this year on Long Island.

In the Adirondack and Catskill Fire Towns 198 fires, burning 1,624 acres, did damage to the extent of $2,510 and cost $4,445.42 to extinguish. This is an average area of 8.2 acres per fire. The large areas burned were due to the most unusual conditions which existed late in the fall, when in less than a month in the Fire Towns we had about 250 fires which burned about 13,000 acres.

Perhaps the most dangerous fire, which occurred during the season of 1924, was that which occurred in June in the Cold River section in northern Essex county. This fire burned over 300 acres and was only extinguished after a most determined fight by a large crew of men under the direction of two of the forest rangers. The difficulty of fighting this fire was due to its inaccessability and also to the extremely rough topography of the burned area. However, by the use of two of the gasoline fire pumps the fire was held without spreading after the first day, although it took many days to entirely extinguish it.

The largest fire which occurred in the Fire Towns was in the northwestern part of the town of Stony Creek, and also burned over slightly into two other towns. The area of this fire is estimated at 3,000 acres. This large area was due to the difficulty of reaching it promptly with sufficient crews to control it. The fire started on October 25th, so that this fire was being fought right in the midst of the most difficult part of the fire season.

Summary of Fire Damage.—A summary of the fires of the Adirondack and Catskill Fire Towns shows a total of 484 fires which burned 14,920 acres and did damage to the extent of $14,760. The damage was remarkably small for the area burned over, because the fall fires burned rapidly through the accumulation of dry leaves, but owing to the relatively damp ground underneath did not burn down into the duff to any great extent and did slight damage to the timber. The timber which suffered was young coniferous growth too small to withstand the heat.

Fifty per cent of the total area burned was State land. The total area burned was only about two-tenths of 1 per cent of the total area in the Fire Towns (7,270,000 acres) under protection.

Summaries of forest fire losses by both counties and causes, as well as a summary of fires according to months of occurrence, are submitted herewith:

Summary of Forest Fire Losses in Fire Towns, 1924, by Counties.

COUNTY	Number of fires	Total acreage burned	Total expense of suppression	Acres Private Land Burned				Acres State Land Burned				Value of standing timber destroyed	Value of logs, lumber, etc., destroyed	Value of buildings, fences, etc., destroyed
				Large timber	Second growth	Brush	Waste	Large timber	Second growth	Brush	Waste			
ADIRONDACKS														
Clinton	40	292	$1,234 85	2	173	69	48	......	......	......	......	$460 00	$15 00	....
Essex	82	872	3,267 21	6	392	23	53	80	87	108	123	1,275 00	40 00	$10 00
Franklin	21	95	759 26	......	36	50	5	1	1	1	1	700 00	....	....
Fulton	10	1,771	1,017 90	......	502	1	1	......	1,267	......	......	3,125 00	....	....
Hamilton	23	2,198	1,268 15	825	206	129	4	500	306	225	3	2,170 00	....	....
Herkimer	31	426	1,007 82	6	23	2	151	......	118	4	122	380 00	....	....
Lewis	29	405	1,124 52	25	232	139	9	......	......	......	......	680 00	....	....
Oneida	8	88	96 65	......	1	......	87	......	......	......	......	5 00	....	25 00
St. Lawrence	44	637	2,892 51	190	121	44	155	......	......	......	127	235 00	....	....
Saratoga	15	1,205	1,851 74	......	933	7	15	......	......	250	......	355 00	....	....
Warren	77	4,582	7,578 49	46	270	136	16	2,410	1,204	200	300	3,915 00	185 00	....
Washington	1	1	55 75	......	1	......	......	......	......	......	......	....	....	....
Total Adirondacks	381	12,572	$22,154 85	1,100	2,890	600	544	2,991	2,983	788	676	$13,330 00	$240 00	$35 00
CATSKILLS														
Delaware	15	114	$427 21	......	60	42	10	......	......	......	2	....	....	$5 00
Greene	7	19	193 00	......	3	6	10	......	......	......	......	....	$10 00	....
Sullivan	7	132	174 49	30	51	51	......	......	......	......	......	$150 00	....	....
Ulster	74	2,083	3,174 41	......	583	222	1,263	......	15	......	......	970 00	15 00	5 00
Total Catskills	103	2,348	$3,969 11	30	697	321	1,283	......	15	......	2	$1,120 00	$25 00	$10 00
SUMMARY														
Adironacks	381	12,572	$22,154 85	1,100	2,890	600	544	2,991	2,983	788	676	$13,330 00	$240 00	$35 00
Catskills	103	2,348	3,969 11	30	697	321	1,283	......	15	......	2	1,120 00	25 00	10 00
Grand totals	484	14,920	$26,123 96	1,130	3,587	921	1,827	2,991	2,998	788	678	$14,450 00	$265 00	$45 00

Total damage, $14,760.

SUMMARY OF FOREST FIRE LOSSES IN FIRE TOWNS, 1924, BY CAUSES.

CAUSE	Number of fires	Total acreage burned	ACRES PRIVATE LAND BURNED				ACRES STATE LAND BURNED				Value of standing timber destroyed	Value of logs, lumber, etc. destroyed	Value of buildings, fences, etc. destroyed
			Large timber	Second growth	Brush	Waste	Large timber	Second growth	Brush	Waste			
ADIRONDACKS													
Smokers	85	325	38	125	123	30		5		4	$255 00	$215 00	
Hunters	92	10,405	887	2,174	228	163	2,911	2,883	678	481	9,750 00	10 00	
Locomotives	40	70		65	2	3					90 00		$10 00
Fishermen	39	759	1	351	15	253		4	11	124	975 00		25 00
Incendiary	29	505	171	8	9	7	80	70	95	65	945 00		
Burning brush	21	86		25	21	18		16	4	2	150 00		
Campers	22	295		107	174	12		2			935 00		
Burning building	14	35	2	7	6	20					40 00	15 00	
Berry pickers	11	13		1	7	5					30 00		
Lightning	13	14	1	3	4	3		3			75 00		
Lumberjacks	4	12			10	2					30 00		
Burning rubbish	3	26		24		2					50 00		
Children	3	26			1	25					5 00		
Sawmill	2	1				1							
Steam roller	1	*											
Burning auto	2	*											
Total Adirondacks	381	12,572	1,100	2,890	600	544	2,991	2,983	788	676	$13,330 00	$240 00	$35 00
CATSKILLS													
Smokers	30	535		169	145	221					$315 00		$5 00
Hunters	17	475	30	288	89	68					275 00		
Locomotives	31	110		61	22	25				2	130 00		5 00
Fishermen	3	16		12	4						400 00		
Incendiary	8	486		167	53	251		15				$15 00	
Burning brush	3	2			1	1							
Campers	1	700				700							
Burning building	2	12			6	6						10 00	
Berry pickers	3	9				9							
Lightning	1	*											
Lumberjacks	1	1			1								
Burning rubbish	1	1				1							
Steam roller	1	1				1							
Ku Klux Klan	1	*											
Total Catskills	103	2,348	30	697	321	1,283		15		2	$1,120 00	$25 00	$10 00
SUMMARY													
Total Adirondacks	381	12,572	1,100	2,890	600	544	2,991	2,983	788	676	$13,330 00	$240 00	$35 00
Total Catskills	103	2,348	30	697	321	1,283		15		2	1,120 00	25 00	10 00
Grand total	484	14,920	1,130	3,587	921	1,827	2,991	2,998	788	678	$14,450 00	$265 00	$45 00

*Less than one acre burned.

SUMMARY OF FOREST FIRE LOSSES IN "FIRE DISTRICTS," 1924, BY COUNTIES.

COUNTY	Number of fires	Total acreage burned	Expense of suppression	ACRES BURNED				DAMAGE		
				Large timber	Second growth	Brush	Waste	Standing timber	Logs, lumber etc.	Buildings, etc.
DISTRICT 6										
Suffolk	143	20,814	$4,314 77	1,908	5,400	11,321	2,185	$18,050 00	$665 00	$100 00
DISTRICT 7										
Columbia	12	579	$249 40	85	347	51	96	$905 00	....	$20 00
Rensselaer	38	2,235	1,956 88	10	1,466	509	250	3,595 00	....	....
Saratoga	19	291	194 00	6	82	93	110	390 00	$500 00	....
Washington	1	20	4 50	....	....	20	....	100 00	....	....
DISTRICT 8										
Orange	27	10,669	$1,412 42	251	2,365	4,550	3,503	$2,200 00	$700 00	$335 00
Rockland	17	1,979	632 10	....	1,775	181	23	1,335 00	....	....
Sullivan	35	2,930	2,069 83	100	1,884	904	42	2,395 00	1,200 00	....
Ulster	30	2,100	838 67	8	1,698	326	68	3,230 00	100 00	....
DISTRICT 9										
Allegany	5	1,426	$249 17	....	726	650	50	$300 00	....	$45 00
Cattaraugus	23	1,161	850 69	....	446	690	25	1,395 00	....	20 00
Steuben	8	410	153 36	45	236	85	44	250 00	....	90 00
DISTRICT 10										
Dutchess	20	1,129	$626 88	18	461	252	398	$590 00	....	$15 00
Putnam	35	5,082	1,172 97	424	3,094	759	805	1,295 00	$150 00	....
Westchester	7	242	75 20	....	106	111	25	50 00	....	....
Totals	420	51,067	$14,800 84	2,855	20,086	20.502	7.624	$36,080 00	$3,315 00	$625 00

Total damage, $40,020.

FOREST FIRES OF 1924, ADIRONDACK AND CATSKILL FIRE TOWNS, BY MONTHS OF OCCURRENCE.

COUNTY	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
ADIRONDACKS										
Clinton	....	4	2	9	3	4	2	11	5	40
Essex	2	19	8	20	3	4	1	12	13	82
Franklin	....	2	2	8	3	....	....	3	3	21
Fulton	....	1	....	....	....	1	....	7	1	10
Hamilton	....	1	....	4	4	1	....	11	2	23
Herkimer	....	10	1	6	2	....	1	8	3	31
Lewis	....	3	4	9	4	....	3	4	2	29
Oneida	....	2	....	1	1	1	....	3	....	8
St. Lawrence	....	1	3	14	2	....	4	13	7	44
Saratoga	....	1	....	2	2	2	....	5	3	15
Warren	....	5	1	33	11	5	3	11	8	77
Washington	....	....	....	....	1	....	....	....	....	1
Total Adirondacks	2	49	21	106	36	18	14	88	47	381
CATSKILLS										
Delaware	1	6	....	....	....	1	1	4	2	15
Greene	....	....	2	....	1	....	....	1	3	7
Sullivan	....	1	1	....	1	....	....	2	2	7
Ulster	....	15	3	3	12	9	....	14	18	74
Total Catskills	1	22	6	3	14	10	1	21	25	103
SUMMARY										
Adirondacks	2	49	21	106	36	18	14	88	47	381
Catskills	1	22	6	3	14	10	1	21	25	103
Grand total	3	71	27	109	50	28	15	109	72	484

The following is a classification of the fires of the year by causes:

CAUSES OF FOREST FIRES OF 1924, ADIRONDACK AND CATSKILL FIRE TOWNS

Cause	*No. of Fires*
Smokers	115
Hunters	109
Locomotives	71
Fishermen	42
Incendiary	37
Burning brush	24
Campers	23
Burning buildings	16
Berry pickers	14
Lightning	14
Lumberjacks	5
Burning rubbish	4
Children	3
Sawmill	2
Steam roller	2
Burning auto	2
Ku Klux Klan	1
Total	484

The remarkable thing about the foregoing table is the unusually large proportion of fires caused by hunters. They were responsible for 23 per cent of the total number of fires, burning 73 per cent of the total acreage burned, and causing 68 per cent of the total fire damage.

While locomotives caused 15 per cent of the total number of fires, they were responsible for only one per cent of the total acreage burned and the damage done by these fires in the Fire Towns was slight.

Fishermen caused nine per cent of the total number of fires and burned six per cent of the total area burned.

Smokers as usual caused the largest number of fires. This year they started 26 per cent of the total number of fires which burned six per cent of the total acreage and caused nine per cent of the total fire damage.

While further analysis of the figures of this table is not possible here, enough has been shown to bring out the lamentable carelessness of pleasure seekers in the woods.

A few fires were caused by the burning of brush in connection with the clearing of 4,000 acres of land for the enlargement of the Stillwater reservoir at Beaver river. These fires were not large in extent, nor did they do great damage. The experience gained by the Department in this work, the first of its kind in the Adirondacks, has enabled it to perfect plans for establishing adequate safeguards for any future clearing operations of this kind.

Violations.— The following table containing a summary of violations of the fire law for the year 1924, which although it appears in this part of the report, applies to both Fire Towns and Fire Districts. The cases reported in this table include fires caused negligently, violations of the law and of regulations of the Commission requiring permits to burn brush, also cases of persons refusing to fight fire.

Summary of Violations of Fire Law, 1924
Dec. 1, 1923, to Nov. 30, 1924.

OFFENSE	Total number of cases recovered	Number of cases closed	Amounts recovered
Refusing to fight fire (Sub. 14, Sec. 51)	4	5	$40 00
Failure to lop tops (Sub. 2, Sec. 54)	6	6	115 00
Causing forest fires (Sub. 3, Sec. 54)	109	103	1,949 07
Setting fires to clear land (Sub. 5, Sec. 54)	27	27	144 85
Failure to screen steam engine stack (Sub. 6, Sec. 54)	1	1	25 00
Leaving slash along highway (Subs. 7 and 8, Sec. 54)	1	2	10 00
Total	148	144	$2,283 92

Fire Districts.— Reference has been made above to the organization in the Fire Districts. In one respect, we were able to go somewhat further during the season of 1924 than ever before in affording protection to the areas included within the Fire Districts. One forest ranger in addition to the regular district ranger was appointed for each of the Fire Districts, and these men were of great assistance to the district rangers in instructing fire wardens, posting fire notices and taking actual charge of forest fires when burning. These rangers were also employed during the drought of the fall and rendered most excellent service.

Two of the towns in Suffolk county, Long Island, put on special motorcycle patrols for Sundays and holidays during the spring and summer to take care of the special forest fire hazard created by the large number of picnickers and motorists who travelled the roads of Long Island on those days. These patrols were paid by the towns and no portion of this expense was borne by the State.

Mention has been made of the exceptionally dry weather of midsummer on Long Island. Practically no rain fell during the month of July and the first third of August. Serious forest fires resulted, notably one which burned on the 8th, 9th and 10th of August which covered about 5,000 acres before it could be brought under control. This fire demonstrated the need for more special fire-fighting equipment in that territory and more forest rangers.

One other large fire occurred in the Fire Districts on Schunnemunk mountain in Orange county. The efforts of the fire wardens and their crews in attempting to control this fire were for a long time unsuccessful. Here again the need for a forest ranger who can devote his entire time to the work of fighting fires was forcibly demonstrated.

The third big fire which occurred in the Fire Districts was one which broke out early in November on Wheeler mountain in the town of Grafton, Rensselaer county. This fire burned over about 2,000 acres and was fought for several days before it could be brought under control.

Because of the advantages which have resulted from the system of requiring permits for all fires set to burn brush or clear land in the Fire Towns, it was decided this year to try out a similar system in a part of the Fire Districts. Therefore, on February 28, 1924, the following regulation was adopted by the Commission:

> "REGULATION No. 1. No person shall set, or cause to be set, fire for the purpose of clearing land or burning logs, brush, stumps or dry grass in any part of the Towns of Peterburgh, Berlin, Stephentown, Hoosick, Pittstown, Grafton, Poestenkill, Sand Lake, Nassau or Brunswick, all in Rensselaer County, without first having obtained from a district ranger or firewarden a written permit so to do."

The area selected for this permit system was one rather well covered by fire observation stations and an area within which it seemed possible to enforce the requirement. The permits have been issued by the fire warden, and it is due largely to the cooperation of these men in issuing permits for which they receive no compensation of any sort, that this system has been so successful in the area to which it was applied this year. It is hoped to extend it to other sections of the Fire Districts in the near future. As we increase the number of our fire observation stations and rely upon those stations to detect forest fires, it becomes increasingly necessary to regulate burning by permits in order that there may be no false alarms of fire sent in by the observer, who, unless he is notified in advance where burning is to be done, cannot tell when the smoke begins to show whether the fire is under control or not. The fire wardens immediately notify the observer when they issue permits, and in that way a check is had on all burning of any kind.

Statistics of fires of 1924 in the Fire Districts show a total of 420 fires, burning 51,067 acres and doing damage to the extent of $40,020.

The fires of the year classified by causes are as follows:

Causes of Forest Fires 1924, Fire Districts

Cause	*No. of Fires*
Smokers	126
Hunters	85
Locomotives	69
Burning brush	52
Campers	31
Fishermen	12
Berry pickers	12
Children	11
Burning rubbish	11
Incendiary	3
Burning buildings	2
Lightning	1
Tractor	1
Oil drilling	1
Sawmill	1
Tracer bullets	1
Lumberjacks	1
Total	420

The Weeks Law.— The Federal Government has continued to cooperate with the State by providing funds for forest fire control in accordance with the provisions of the so-called Weeks Law. The funds received this year have been somewhat less than last, but the allotment made while not large has been of importance because it has enabled us to maintain the protection system in the Fire Districts. The allotment for the fiscal year beginning July 1, 1924, is $19,875.

Railroads.— Inspection of railroad locomotives and rights-of-way has been continued during the season of 1924, and every effort made to see that fire protection appliances on locomotives were kept up to standard in compliance with the Conservation Law and the requirements of the Public Service Commission. Oil burning was required on certain of the railroads operating in the Adirondacks as in the past, in accordance with the order of the Public Service Commission. Early in the season of 1924, the New York Central Railroad appealed to the Public Service Commission for permission to be relieved from the necessity of operating oil-burning locomotives on account of the greatly increased cost which they claimed for such locomotives over the cost of operating coal burners. This appeal was opposed by the Conservation Commission on the grounds that experience had proved the oil burners to be safe and that the importance of protecting the forests from fire made it unwise to discontinue the use of oil-burning locomotives in favor of coal burners just for the sake of saving expense of operation when the difference was within the present limits. Up to the time of writing this report, we have not been informed that any decision in this case has been rendered by the Public Service Commission. Pending such decision, the use of oil-burning locomotives has, of course, continued.

The order of the Public Service Commission, requiring the use of oil-burning locomotives during the daytime, applies only from April 15th to November 1st. The latter date in 1924 came in the midst of the greatest fire hazard of the whole year and the Conservation Commission requested the Delaware and Hudson Railroad and the New York Central Railroad to continue the use of oil burners until there should be rain or snow to relieve the forest fire danger. The response of the railroads to this request was immediate and complete, and as a result the oil burners were operated until November 15th.

Experiments have been conducted during the past two seasons by the New York Central Railroad on its Adirondack Division, to determine the most effective and most economical method of clearing the right-of-way. Certain sections have been burned broadcast spring and fall. Certain other sections have been mowed and burned in the fall, whereas still others have been left unmowed in the fall with the idea of burning them in the spring. It is too early to report the results of these experiments, although it is expected that they will develop new information as to effective methods of keeping railroad rights-of-way clear of inflammable material.

Slash Disposal.— The laws prohibiting the leaving of slash or cut brush adjacent to public highways or railroads, now apply in the Fire Districts as well as in the Fire Towns. The enforcement of these laws has meant continual patrolling by forest rangers, interviewing landowners, lumbermen, highway workers and others with a view to broadcasting general information as to what is required by the law and the reason for requiring this protective strip along highways and railroads. The reason is obviously to reduce the fire hazard so that there will not be an accumulation of slash, brush and other inflammable material to furnish fuel for forest fires, when a match or cigarette is carelessly tossed out of a passing vehicle; and when it is thoroughly understood by landowners and others, it is believed there will be no difficulty in getting the cooperation of all in the enforcement of this statute.

Equipment and Permanent Improvements.— Five new observation stations were established during the season of 1924. One of these was on Chapin Hill in Sullivan county, the expense of which was borne by funds subscribed by the Board of Supervisors of Sullivan county, as mentioned in the last annual report. This station was completed early in the spring in time for use throughout the 1924 fire season.

One station was built on Dix Hill in western Suffolk county, Long Island, and completed very early in the spring. Funds for this station were subscribed by an interested landowner in the vicinity of the station.

The city of Troy subscribed $1,000 towards the expense of establishing a fire observation station on Dickinson Hill in the town of Grafton, Rensselaer county. This station was equipped with a sixty-foot tower erected this spring, and has been of great assistance in detecting fires in that part of the county. The city's interest in this station is that it covers the forested area on the city watershed, including hundreds of acres of plantations.

A new station was established on Hartzfelt Hill on the high land south of Olean, Cattaraugus county. The funds for the establishment of this station, which includes a sixty-foot steel tower and also a cabin for the observer, were provided by subscriptions from local landowners and others interested in forest fire control in that section, also by some funds subscribed by towns in the vicinity of the station.

The last of the new towers erected during 1924 was erected and paid for by a landowner and the tower was placed on Pillsbury mountain in central Hamilton county. A secondary station has been operated on this mountain for some years and this has served to demonstrate the suitability of the mountain for an observation station. The new tower will be operated as an observation station by the Conservation Commission.

In accordance with the Commission's policy of keeping up the cabins at the observation stations, new cabins have been erected at the following stations: Mount Morris, Hamilton Mountain, Cathead Mountain, High Point, Twadell Point, Hunter Mountain, Cornell Hill. The expense of the last of these cabins was borne by an owner of land in the vicinity of the station, who has cooperated generously in the establishment of the station.

There has been a steady improvement in observation station telephone lines and in the trails to the stations. Obviously, the keeping up of telephone lines is an absolute necessity if the station is to function as as it should. The maintenance of the trails is not only of value in enabling the observer to look after his telephone line, get supplies to the station, etc., but also encourages persons to visit the stations.

The Commission welcomes visitors at its fire observation stations. We are glad to have persons see the work which is being carried on, and the educational value of a visit to an observation station with the information the observer can give the visitor regarding the State's fire control system is very great. During the year 1924, a total of 52,025 visitors were registered at our fire observation stations:

FIRES REPORTED FROM OBSERVATION STATIONS IN 1924 AND VISITORS REGISTERED.

STATIONS	Fires reported 1923	Fires reported 1924	Visitors registered 1924
Adams	3	2	41
Ampersand	13	12	432
Arab	28	4	502
Azure	28	1	271
Bald	29	19	152
Balsam Lake	16	12	229
Beaver Lake	31	20	65
Belfry	2	4	137
Belleayre	10	12	1,150
Black	5	5	1,805
Blue	8	7	2,537
Boreas	15	18	53
Cat	31	21	342
Catamount	25	7	551
Cathead	11	24	333
Crane	34	31	221
DeBar	27	18	70
Fort Noble	2	2	300
Goodenow	1	2	132
Gore	4	11	221
Hadley	10	32	312
Hamilton	11	21	745
High Point	11	75	169
Hunter	3	3	437
Hurricane	8	7	430
Kempshall	7	9	323
Loon Lake	26	10	62
Lyon	12	21	130
Makomis	8	8	205
Mohonk	26	45	14,648
Moosehead	23	8	127
Moose River	21	12	464
Mount Morris	12	10	368
Owlshead	4	14	397
Pharaoh	5	15	650
Pillsbury*	......	8	50
Poke-O-Moonshine	16	8	1,242
Prospect	25	27	1,800

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*Established 1924.

STATIONS	Fires reported 1923	Fires reported 1924	Visitors registered 1924
Red Hill	15	10	450
Rondaxe	6	3	6,027
St. Regis	16	15	1,087
Snowy	2	8	874
Stillwater	28	5	64
Swede	20	15	833
T. Lake	4	8	438
Tomany	7	15	650
Tooley Pond	30	10	691
Tremper	11	6	998
Twadell	23	23	574
Vanderwhacker	5	11	89
Wakeley	5	12	55
West	19	9	527
Whiteface	24	25	1,662
Woodhull	7	7	301
Total	773	747	47,423
Fire Districts			
Chapin*	......	24	35
Cornell*	......	65	630
Dickinson*	......	45	660
Dix*	......	68	1,250
Flanders	61	50	64
Hartzfeldt*	......	27	735
No. 7	42	55	1,019
Sterling	41	13	93
Telescope	138	137	116
Beacon	19	12	....
Grand total	1,074	1,243	52,025

Fire Pump Equipment.— The experience of the past year has confirmed the Commission's judgment that the use of gasoline fire pumps to combat forest fires was good policy. The plan adopted sometime ago of purchasing a few additional outfits of this kind each year has been followed and there were purchased this year for the use of the rangers six new Evinrude fire fighting outfits. These outfits have previously been supplied with 1,000 feet of discharge hose but it was found that this was insufficient so we have, therefore, increased the allotment for each pump from 1,000 feet to 1,400 feet. This year's purchases bring the total up to twenty-five power fighting outfits, which is far short of the goal of one gasoline fire pump for each ranger, but which is, nevertheless, of great assistance to us in taking care of fires.

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* Established 1924.

Some cases of forest fires which burn deep into the duff or humus on the ground can only be extinguished by flooding them with a large quantity of water. On the Cold River fire in June, 1924, it was necessary to use two gasoline pumps, one to raise the water from the stream as high as possible and the second pump to deliver water on the fire. It would have been impossible to extinguish this fire without these outfits.

An investigation of several hand pumps showed the value of the French Vermorel spray pump which consists of a can shaped like a knapsack which is carried on the back and a lever easily operated by one hand which enables the operator to deliver a stream of water on a fire through a short length of hose held in the other hand. Every forest ranger has been supplied with one of these outfits during the past year, and a supply has been sent out to the Fire Districts for the use of firewardens. A considerable quantity of fire tools, including both Vermorel pumps and Double Forester pumps, as well as axes, shovels, grub hoes, rakes and hoes was purchased out of Federal funds available for this use, and supplied the firewardens in the Fire Districts. It is hoped to keep up this practice of supplying special fire fighting equipment to the firewardens, because it not only enables them to fight fires more efficiently, but also goes far to stimulate their interest in forest fire control.

The outstanding feature of special fire fighting equipment acquired during the year was the special forest fire truck which was acquired early in the spring and sent to the Long Island district. This consisted of a Ford truck and Evinrude forest fire fighting outfit. The truck carries the gasoline fire pump and hose, also 4 large barrels of water for use where water is not available. It also carries a few of the smaller hand pumps and a supply of tools.

We have not really had many opportunities to try out this outfit during the past season, because the truck as first equipped lacked sufficient power to do the work required of it. Necessary changes were made early in the fall, and it is believed that this equipment will go far to solving our forest fire problem on Long Island.

Forest Protection Week

Governor Smith issued a proclamation designating the week of April 20, 1924, as Forest Protection Week:

PROCLAMATION

STATE OF NEW YORK — EXECUTIVE CHAMBER
ALBANY

Forest fires are the greatest single enemy of forest destruction. Forest fires remove the protecting cover from our watersheds, deprive wild life of shelter and food, deprive the people of the enjoyment of their forest playgrounds and permit the washing of vast quantities of soil into the streams and rivers, thereby increasing the cost of their maintenance. The lumber and property loss alone from forest fires in one year throughout the country approximates $17,000,000.

Ninety per cent of forest fires are due to ignorance and carelessness so that this great loss, or most of it, can be prevented through the education of the public to the necessity of care in the use of fire in the forests.

Therefore, I, Alfred E. Smith, Governor of the State of New York, do hereby proclaim the week beginning Sunday, April 20, 1924, as

FOREST PROTECTION WEEK

and I call upon all public officials of the State and the political divisions thereof, upon the press and the pulpit, teachers, officers of sportsmen's associations, commercial and industrial organizations to join in the work of insuring better protection to the forests by urging upon all who go into the woods the utmost care in the use of fire.

Given under my hand and the Privy Seal of the State at the Capitol in the City of Albany this fourteenth [L. S.] day of April in the year of our Lord one thousand nine hundred and twenty-four.

(Signed) ALFRED E. SMITH

By the Governor:
George B. Graves,
Secretary to the Governor.

Fire Warnings.— Fire warnings were broadcast by radio from W. G. Y. at Schenectady and from W. H. A. Z., Troy, at various times during the season. Special warnings during the fire danger of the fall were gotten out with the cooperation of these stations.

The usual fire warning notices have been prepared and posted in the woods. During the fall a special effort was made to post roads and trails more thoroughly than was ever done before. This work will be continued during the coming season in order that no person may go into the woods without having his attention called to the forest fire danger.

Probably the most effective warning ever issued was the Governor's proclamation prohibiting hunting and camping in the fall. This proclamation, which brought to a stop all hunting and camping, made people realize the necesssity for care with fires and also showed that forest protection is an essential and that it must take precedence over any use of the forests by the public. It is hoped that the warning conveyed by the proclamation and by the forest fire experience of the past fall will strike home in the minds of all persons using the woods so that such drastic measures will not be necessary in the future.

Personnel.— Winter meetings of the forest ranger force were held in the various districts during the early part of 1924 for the purpose of bringing the various members of the field force of rangers and observers together and instruct them with regard to their work. The importance of these meetings in raising the standard of loyalty and service cannot be exaggerated. It is realized that such meetings cannot be held during the busy field season, and as the next best thing the office has started a service letter entitled "The Observer," which is being published once a month and distributed to all members of the field force. The advantages of this publication are many, because it not only contains instructions for the field force but also shows each member of the force what others are doing and gives him an opportunity to profit by their experiences.

The work done on the forest fires of the fall bears striking testimony of the loyalty and faithfulness of our field force. At a time when every ranger had one or more fires burning in his district and every observer needed to be on the job, there was no complaining and each man was doing his work in such a way that the fires were held down to a minimum. No one who was not in close touch with events during this extremely bad fire season can realize what the faithfulness of rangers and observers did to prevent a veritable catastrophe.

WALTER C. RICE

In the death of Walter C. Rice of Saranac Lake, the Commission mourns the loss of an efficient and loyal employee. Mr. Rice served as Observer on the Ampersand Mountain Observation Station from May 1, 1915, until failing health in May, 1922, forced him to relinquish the duties of his position on one of the most difficult and most important of all the fire observatories. A man of life-long experience in the Adirondack forest, his heart was in his work and his unswerving faithfulness to every task assigned him enabled him to render service of the highest order to the Commission and to the people of the State of New York.

CARROL SNELL

Carrol Snell of Piercefield, who had served as Observer for two years on Arab Mountain Observation Station, died in March, 1924, and the Commission lost a most efficient and able Observer.

ARCHIE CARDINAL

The death of Archie Cardinal of Childwold, brought to a close Mr. Cardinal's service as Observer on Moosehead Mountain Observation Station, a position which he had filled for four years. Mr. Cardinal's excellent knowledge of the territory visible from the Station enabled him to locate fires with great accuracy.

GIPSY MOTH CONTROL

More than one hundred men are now actually engaged in the Hudson Valley in the battle to keep the gipsy moth out of New York State. The fight against this insect, undertaken by the Conservation Commission over a year ago, was diligently pursued in the Hudson Valley during the past year.

During the summer months quite an extensive survey of the State west of the Hudson River, in search of this insect, failed to reveal its presence, which at the present time indicates that the danger of an invasion of the State by this pest is still confined to the Hudson Valley. Hence, the renewal of the vigorous campaign in that section. It also indicates that the act of the Conservation Commission in this attempt, both as to location and date of starting the fight, was a timely one.

Extremely encouraging results have been secured in the past year's campaign. Present indications are that complete eradication of all colonies found in the barrier zone area in New York State has been secured. Equally encouraging reports have been received from the Federal Bureau of Entomology on conditions in the section of the barrier zone in New England over which they have supervision. It now seems that the continuance of this vigorous campaign will keep this extremely dangerous enemy of shade, fruit and forest trees out of the State.

The success of a one year's campaign is encouraging when it is considered that millions of dollars have been expended in the fight against this insect in New England and a yearly increase in size of territory was evident until the past year when the fight was taken up by the Conservation Commission.

The successful control of the gipsy moth depends to a very considerable degree upon the early discovery of its presence in any locality. With this in view, a very diligent campaign has been conducted during the past year to keep this most destructive insect out of New York State. The most extensive operations have been confined to the danger zone, better known as the barrier zone, an area comprising some 4,000 square miles in the Champlain, Hudson and Harlem valleys of the State.

The most important activities pursued have been the organization of a force adequate to carry out the work; intensive work, scouting of part of the Hudson Valley area; eradication work, such as creosoting the egg clusters, applying tree banding material and spraying at the eleven places where the insect was discovered; an extensive study of wind currents and their relation to gipsy moth dispersion; and a survey of practically the entire section of the State west of the Hudson River to determine whether this insect was present outside the barrier zone section.

Organization.— Our aim in building up a gipsy moth force has been to secure men whom we believed would be interested in the problem and who could eventually qualify as experts in this line of work. All applicants selected were sent to New England where the gipsy moth was abundant enough to give them training in the work they were to follow out. In spite of a very careful selection of the applicants, less than thirty-three per cent of those who reported to the training school continued on the work after their return to New York. Regardless of this serious handicap, more than one hundred men were actually engaged in the scouting work early in October.

Nature of the Work.— By far the greater part of the work in connection with the gipsy moth barrier zone project is in what we term "scouting." The work involved in carrying out the definition of the word has probably little significance to the average reader especially those unfamiliar with the gipsy moth problem.

Searching for Gipsy Moth egg clusters in stone wall The wall has to be rebuilt after the egg clusters have been treated.

Gipsy moth caterpillars have some preference as to the kind of trees on which they feed. The adult female moth, however, does not seem to have any particular choice as to species of trees, or objects near trees, on which to deposit its egg clusters. The latter are as frequently found on stone walls, buildings or other objects near trees, as on the trees. In fact, 40 per cent of the gipsy moth egg clusters found in the Hudson Valley during the past scouting season were found on stone walls adjacent to wooded areas, or other shade or pasture trees.

It is necessary, in order to thoroughly scout a town or given section, to inspect all trees or shrubs, or other objects near them over the entire area. Consider for a moment the number of trees, including the fruit trees, in any town. Eliminate the solid wooded areas of over ten acres and, by little further consideration of the time it takes to go from one tree to another over the rolling open country of the Hudson Valley, permitting of course time to make the inspection, a fair definition of what scouting means can be derived, especially when it applies to an area as large as that of the section of the gipsy moth barrier zone in New York State, which as now defined is about 4,000 square miles.

Scouting Work.— Unusually early heavy snowfalls and extremely cold weather have handicapped gipsy moth work in Northern New England. In order to avoid all of the interference from climatic conditions possible, the first crews of men who qualified for the scouting were assigned work in Washington county. As soon as work in the towns in that section was completed, the men were transferred to the counties farther south. A greater percentage of the Washington county territory was scouted than any other county in the barrier zone area.

It was very apparent, before the work had been in progress for any great length of time, that the original estimate of the cost of the work in maintaining a gipsy moth barrier zone, figures for which had been based on figures of somewhat similar work in an entirely different type of country than the Hudson Valley, were considerably too low. Additional funds could not be promptly secured, which necessitated reducing the scouting force in the early spring and likewise reducing the amount of work that it was hoped could be done in the other counties of the zone. The map and summary of the work, both shown on separate pages, show clearly the progress that has been made and the location and degree of infestations found.

Banding and Spraying.— Through the courtesy of the office of the United States Department of Agriculture, Bureau of Entomology, Melrose Highlands, Mass., tree banding material of their own manufacture, which is applied to the trees in the early spring to prevent the caterpillars from getting into the trees, was furnished for our use. We were also fortunate in securing from the same source two high-pressure motor truck spraying machines, which facilitated getting an early application of spray at all of the gipsy moth infestations found in New York State. A second application of spray was made at all places where certain kinds of foliage had not entirely developed at the time the first spray was applied.

Long Island Work.— During the late winter and early spring a very diligent spraying campaign was conducted in an attempt to completely eradicate the gipsy moth colonies at Greenport and Patchogue, Long Island. These infestations, both of which were located in June, 1922, at that time covering over one square mile of territory and consisting of over 1,000 egg clusters at each place, had been reduced to five egg clusters at Greenport and fifteen at Patchogue, last year. Without a doubt, this year's campaign has further reduced, if not completely eradicated, these infestations. Men and funds for the work on Long Island were furnished by the United States Department of Agriculture.

Summer Work.— During the past few years many shipments of nursery stock from the gipsy moth infested area in New England have been received in New York State. Although all of the material is inspected at the point of shipment, there is always a probability of a gipsy moth egg mass being overlooked. During the summer months an inspection of the properties where this material was planted during the past four or five years has been made, and in addition included inspections of prominent camping places, summer resorts, hotels, garages, city and town parks, amusement resorts, estates and other places frequented by tourists traveling from the gipsy moth infested area. In carrying out this phase of the project inspections were made in every county of the State west of the Hudson River. A summary of results is given in this report.

Applying tree banding material to prevent Gipsy Moth caterpillars from getting into the trees.

Required Efficiency Standing.—An efficiency check on the quality of insect control work is rather difficult to obtain, especially on insects of the habits of the gipsy moth, when carried on on a large scale over extensive areas. To maintain as high a standard of efficiency as possible in the gipsy moth work, each member of a scouting crew is assigned a mark or symbol which he is to place on every tree he inspects. A small knife, constructed especially for the purpose, is used in marking the elms, oaks or other trees with a rough or heavy bark. Lumbermen's crayon is used for marking the trees with a more tender bark. This system permits making a definite check at any time on the quantity and quality of work performed by any member of a crew. Another method which has proven very beneficial as an efficiency check, the records of which are definitely secured at little cost, is the use of artificial gipsy moth egg clusters. The artificial clusters are made from a preparation of cement and other ingredients of the color and moulded in the shape of a natural egg cluster, so constructed that they can be placed on trees or other objects where gipsy moth egg clusters are usually found. While the gipsy moth infestation in the barrier zone is much more severe than anticipated, the infestations are a considerable distance apart; therefore the scouting crews occasionally work for quite long periods without finding any sign of the insect. While covering such territory the use of artificial egg clusters proves beneficial and increases the efficiency of scouts in this work.

Gipsy Moth spraying crew at Hampton, New York. Men on hose line 3,000 feet from the spraying machine.

Colonies of from one to ten or more artificial clusters are placed in the field in sections that the scouting crew will cover in a short time; the particular locations are unknown to the men who will cover the area. The artificial colonies are marked on a map with a description of the number used and where placed at each point. The number found and by whom is indicated on reports covering the period that that particular section is scouted. Upon receipt of reports denoting discovery of artificial colonies, reference to the map of that town is all that is necessary to determine the percentage that has been found.

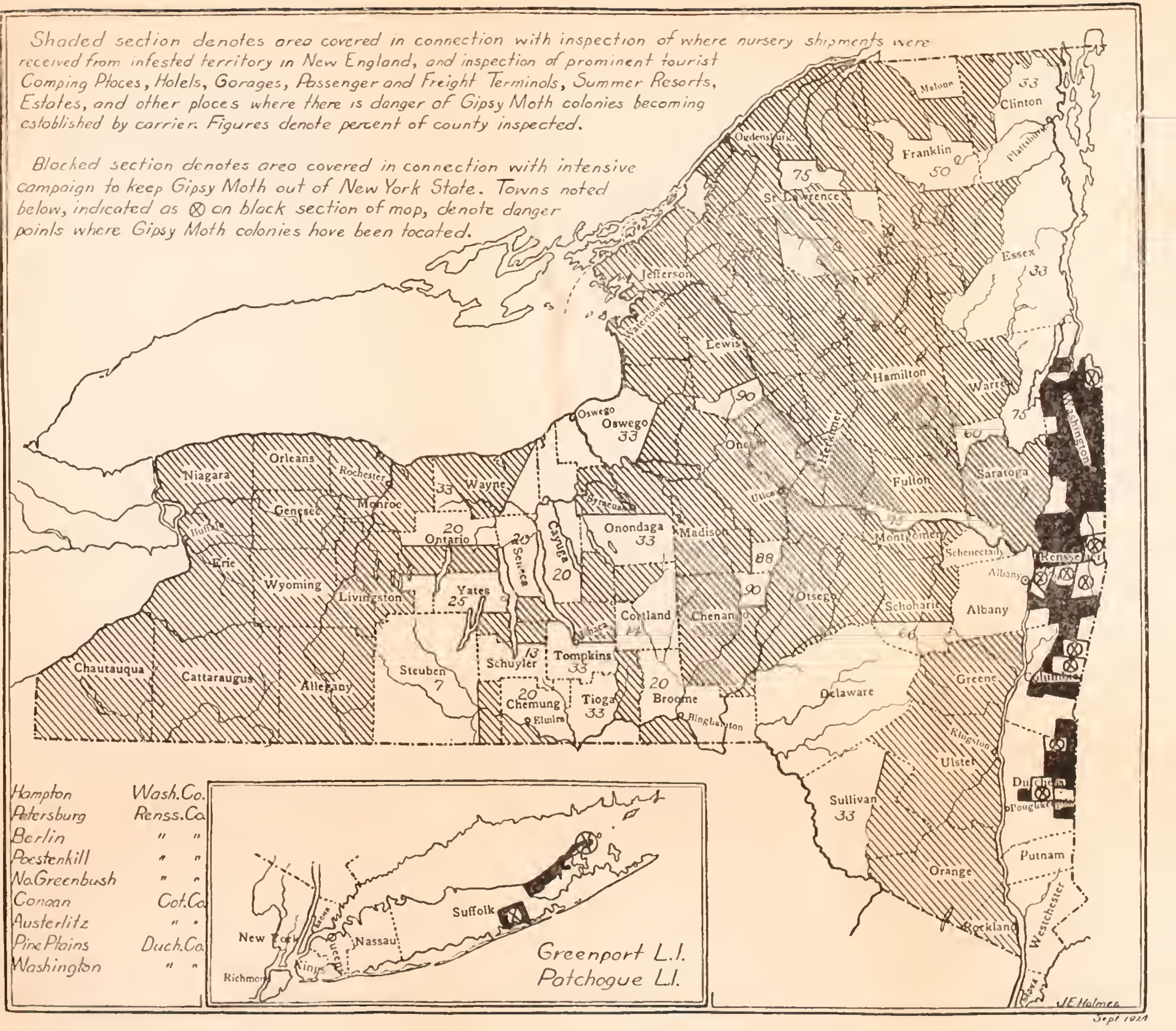
All scouting crews are advised that artificial gipsy moth egg clusters are distributed quite generally over the area in which they are working and that all, or at least a very high percentage, must be located in order to avoid penalty which is imposed for failure to attain a high standard of efficiency.

Educational.— Lectures, moving picture reels, radio messages and lantern slides, pertaining to gipsy moth conditions, have enabled residents, especially those of the barrier zone area, to realize the imminent danger of an invasion of the gipsy moth in eastern New York and the necessity of their cooperation in our fight to keep it out.

An exhibit case approximately two feet wide, four feet high and four feet long, containing an admirably prepared gipsy moth group, showing the various stages of the life cycle of the insect amid natural surroundings, has been secured. Full grown caterpillars are shown feeding on small willow, oak and pine trees which the case contains. The adult moth, both male and female and also the egg clusters are shown in natural positions. Riker mounts also showing the life cycle of the gipsy moth have been secured for distribution among the agricultural associations in the Hudson Valley. Again we are indebted to the office of the Bureau of Entomology, Melrose Highlands, Mass., for the excellent specimens they furnished for these mounts. The exhibit case, also the Riker mounts along with other descriptive data, have been exhibited at all important agricultural or industrial fairs held in the eastern section of the State during the past year. The former has attracted considerable attention at Saratoga, where it has been on exhibition during the past summer.

Wind Spread.— The investigation of wind currents commenced last year has been continued on a more extensive scale for the purpose of obtaining fuller data respecting air movements in both the Hudson and Champlain valleys. The latter is especially important since the discovery of small outlying gipsy moth infestations just east of Lake Champlain. Air current data when temperatures are 60 degrees F. or higher, during the period that the young caterpillars are small enough to be carried by the winds, are particularly important. The investigation this year extended from May 14th to June 9th.

Wind or Air Currents.— The plans of last year were continued practically without change, except that a few additional balloon stations were established in northern New York and in Vermont, and the two southwestern stations of last year were moved to north-



Shaded section denotes area covered in connection with inspection of where nursery shipments were received from infested territory in New England, and inspection of prominent tourist Camping Places, Hotels, Garages, Passenger and Freight Terminals, Summer Resorts, Estates, and other places where there is danger of Gipsy Moth colonies becoming established by carrier. Figures denote percent of county inspected.

Blocked section denotes area covered in connection with intensive campaign to keep Gipsy Moth out of New York State. Towns noted below, indicated as ⊗ on black section of map, denote danger points where Gipsy Moth colonies have been located.

Hampton	Wash.Co.
Petersburg	Renss.Co.
Berlin	" "
Poestenkill	" "
No.Greenbush	" "
Canaan	Col.Co.
Austerlitz	" "
Pine Plains	Duch.Co.
Washington	" "

Greenport L.I.
Patchogue L.I.

J.E.Holmes
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western Connecticut and adjacent locations in New York for the purpose of obtaining records in an area influenced by a marked break in the Berkshire range. Last year these two stations were located at Sheffield, Mass., and Copake Falls, N. Y., being separated by one of the highest portions of the range. The five stations along the Mohawk Trail were located on the same sites as last year and with the identical equipment. Temperature and humidity records were obtained by self-recording Draper instruments, loaned through the courtesy of the Gipsy Moth office, Federal Bureau of Entomology, at four stations, namely, Chazy, N. Y., St. Albans, Vt., Hoosac Mountain and East Charlemont, Mass. Hand anemometers, also loaned by the Federal Gipsy Moth office, and operated at Chazy, N. Y., St. Albans and Londonderry, Vt., were Salisbury, Conn. Hourly records of temperature and wind direction were required at all stations not provided with recording instruments. Temperature and wind records were also secured through the cooperation of observers at the following fire stations: Witherbee, Keeseville and Stephentown, N. Y., Lanesboro and Mt. Washington, Mass. Transcriptions of hourly records, giving wind direction, velocity and temperature for this period were secured through the kindness of observers located at a number of Federal stations in the northeastern United States.

The following is a list of the regular balloon and weather stations: Chazy and Whitehall, N. Y., St. Albans, Clarendon and South Londonderry, Vt., No. Petersburg, N. Y., No. Adams, Hoosac Mt., West Charlemont and East Charlemont, Mass., Salisbury, Conn., North East, N. Y., Deerfield and East Hampton, Mass., and East Granby, Conn. Balloons were also released from miscellaneous stations, the more important of which are located as follows: Adams, Mass., Berlin, Canaan and Millbrook, N. Y., Williamstown and South Hadley, Mass.

Earlier tabulations show a marked predominance of easterly winds in eastern New England. The data for the past year, summarized below, indicate less than the usual difference, though Concord, Boston and Providence had distinctly more easterly wind than the other stations. The wind mileage when the temperature is above 60 degrees F. is particularly important, because young gipsy moth caterpillars do not drift with the wind when it is cooler; consequently this mileage is shown by itself. These figures cover a period of twenty-seven days and the drift any one day must be considerably less than the totals given.

Summary of Easterly Winds, May 14 to June 9, 1924.

STATIONS	TOTAL WIND MILEAGE			Totals	WINDS ABOVE 60 F.			Totals
	N. E.	E.	S. E.		N. E.	E.	S. E.	
Chazy, N. Y.*	137	77	284	....	122	55	181	....
St. Albans, Vt.*	33	6	147	....	22	....	116	....
Northfield, Vt	112	2	210	....	73	....	108	....
South Londonderry, Vt.*	49	24	134	....	30	19	104	....
Burlington, Vt	27	....	41	....	15	....	37	....
Average mileage	....	....	....	256.6	53	14.8	109	176.2
Totals	358	109	816	1,283	262	74	546	882
North Petersburg, N. Y.	6	4	42	....	6	2	28	....
North Adams, Mass	11	13	147	....	....	....	60	....
Hoosac Mountain, Mass	7	115	248	....	....	88	42	....
West Charlemont, Mass	8	11	279	....	6	4	175	....
East Charlemont, Mass	58	173	260	....	58	63	138	....
Average mileage	....	....	....	276.4	14	31.4	88.6	134
Totals	90	316	976	1,382	70	157	443	670
Albany, N. Y	70	7	5	....	39	7	5	....
Amherst, Mass	42	13	2	....	33	11	....	....
Salisbury, Conn.*	41	93	21.5	....	26	22.5	17.5	....
New Haven, Conn	281	12	120	....	118	7	53	....
Average mileage	....	....	....	174.75	54	11.87	18.7	84.75
Totals	434	125	148.5	699.5	216	47.5	75.5	339
Concord, N. H	64	55	126	....	41	29	32	....
Boston, Mass	150	103	274	....	85	61	150	....
Providence, R. I	98	61	79	....	52	47	37	....
Average mileage	....	....	....	336.6	59	45.6	73	178
Totals	312	219	479	1,010	178	137	219	534

* Records from hand anemometers.

Temperature and Humidity Records.— Draper self-recording thermographs and hygrometers were operated at four stations. It will be seen, by reference to the table below, that the Chazy and St. Albans records parallel rather closely. Hoosac Mt. shows lower temperatures and higher humidities, while East Charlemont is intermediate between the mountain and the Champlain valley stations.

Summary of Temperature and Relative Humidity Records showing Range in the Daily Means, Maxima and Minima and their Averages for the Period of Record, May 11 to June 11, 1924.

Chazy, N. Y	Range	61–45	75–51	53–30	89–39	100–53	75–30
	Average	53	62	42	64	84	41
St. Albans, Vt	Range	63–43	74–52	56–32	80–46	94–72	67–28
	Average	53	62	44	63	80	46
Hoosac Mt., Mass	Range	52–34	73–42	46–32	89–46	93–64	85–28
	Average	43	55	38	66	83	47
East Charlemont, Mass	Range	58–42	72–47	51–29	83–34	89–56	79–25
	Average	51	63	39	64	86	38

Balloon Work.— The wind studies summarized above were supplemented by releasing from the various stations over 8,000 hydrogen-inflated toy balloons, for the purpose of obtaining records of actual drift. The balloons were liberated at hourly intervals from 7 A. M. to 6 P. M., standard time, additional balloons being released on the quarter hours between 9 and 11 A. M. and 3 and 5 P. M., and on the half hours from 11 A. M. to 3 P. M., and at 5:30 P. M., except when temperatures were below 60 degrees F., or during the prevalence of rain. There was attached to each balloon a numbered tag, requesting the finder to give his name, address, the place and date where found and asking him to return the tag and he in turn would be informed as to the time and place of liberation. Records were kept of the locality, time and wind conditions when each balloon was released.

The balloon work commenced May 14th and continued until June 9th, the men doing this in connection with weather observations described above and being instructed to inflate for a minimum buoyancy, since it is presumably the lower air currents that are most important in carrying the young gipsy moth caterpillars.

The following tabulation shows the number of balloons liberated from various stations and other data in relation thereto:

TABLE OF BALLOONS RELEASED, TAGS RETURNED AND VELOCITIES, AUGUST 1, 1924.

LOCALITIES	Balloons released	Tags returned	Per cent returned	Balloons Drifting 5 Miles or More			Velocities	
				No.	Mileage	Average mileage	Range	Average
Chazy, N. Y.	482	35	7 plus	30	1,762	58.73	.714–8	3.738
St. Albans, Vt.	554	36	6 plus	27	2,221	82.26	4–44	16.35
Whitehall, N. Y.	528	14	2 plus	12	1,429	119.08	2.378–10	6.186
Clarendon, Vt.	499	29	6—	28	2,726	97.36	2.18–28.33	10.53
South Londonderry, Vt.	470	25	5 plus	24	2,632	109.67	4–42.50	17.66
North Petersburg, N. Y.	563	44	8—	39	3,666	94	1–100	29.7
North Adams, Mass.	551	42	8—	24	1,826	76.08	.05–33	11.14
Hoosac Mt., Mass.	416	18	4 plus	17	980	57.64	2–16	8.75
West Charlemont, Mass.	418	32	8—	28	1,838	65.64	4–38	16.09
East Charlemont, Mass.	498	42	8 plus	36	1,949	54.14	.14–28.57	8.55
Salisbury, Conn.	426	31	7 plus.	26	3,170	121.92	.73–26.67	11.15
North East, N. Y.	555	47	8 plus	39	3,035	77.82	2–44	16.80
Deerfield, Mass.	590	23	4—	22	2,025	92.05	1.67–27.14	44.70
Easthampton, Mass.	589	48	8 plus	42	2,819	67.12	2.50–23.75	14.67
East Granby, Conn.	559	59	11—	52	2,794	53.73	1.74–51.43	14.2
Miscellaneous localities	603	57	9 plus	43	1,680	39.07	....	......
Total and averages	8,301	582	6 plus	489	36,552	79.14	....	......

The percentage of returned tags for the various stations ranges from over two to more than nine, the average for all the stations being over six, the lowest percentages naturally occurring at stations located in the wilder, more sparsely inhabited sections.

The average mileage of balloons drifting five miles or more varies in the different stations from nearly 54 to over 121. The average velocity for balloons found the day of liberation ranges for the various stations from nearly three to almost forty-five miles per hour, one balloon drifting at the rate of 100 miles per hour, another traveling 190 miles at over 50 miles per hour and a third 115 miles at 27 miles per hour. These relatively high averages are presumably explainable by somewhat strong westerly winds which resulted in a very marked northeasterly drift, as evidenced by the return of seventeen tags from the province of Nova Scotia, three from the province of New Brunswick and one from Newfoundland, the latter released from Salisbury, Conn., at 4:30 P. M., May 15th and recovered at Felix Cove, Newfoundland, the next day, the airline distance being approximately 775 miles. Another unusual record was the return of a tag from Sable Island, well off from Nova Scotia, the balloon having been released from South Londonderry, Vt., and drifting about 575 miles.

The geographical distribution of recovered tags is shown from the following tabulation.

TABULATION OF BALLOON TAGS RETURNED FROM THE STATES AND PROVINCES.

STATIONS	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	New England totals	New York	New Jersey	Quebec	New Brunswick	Nova Scotia	Newfoundland	Grand totals
Chazy, N. Y.	4	...	9	1	...	...	14	9	...	12	...	...	...	35
St. Albans, Vt	4	..	23	...	...	...	27	...	...	7	...	2	...	36
Whitehall, N. Y.	5	1	6	...	...	...	12	1	...	...	...	1	...	14
Clarendon, Vt.	3	5	17	1	...	...	26	...	...	1	1	1	...	29
South Londonderry, Vt	3	3	11	3	1	...	21	1	...	...	...	3	...	25
North Petersburg, N. Y	8	4	11	9	...	...	32	10	1	...	...	1	...	44
North Adams, Mass	...	...	4	33	1	1	39	1	...	...	..	2	...	42
Hoosac Mountain, Mass	...	3	1	10	1	3	18	...	...	...	...	...	...	18
Charlemont, Mass.	1	3	2	23	1	1	31	...	...	...	1	...	...	32
East Charlemont, Mass.	1	2	3	34	...	...	40	...	...	...	1	1	...	42
Salisbury, Ct.	3	2	1	5	...	14	25	4	...	...	...	1	1	31
North East, N. Y.	1	1	...	15	2	13	32	14	...	...	...	1	...	47
Deerfield, Mass.	2	1	...	12	1	5	21	1	...	...	...	1	...	23
Easthampton, Mass.	3	1	...	36	3	4	47	...	...	...	...	1	...	48
East Granby, Ct.	2	1	...	21	1	31	56	1	...	...	...	2	...	59
Miscellaneous localities	...	2	6	20	2	11	41	16	...	...	...	...	...	57
Totals	40	29	94	223	13	83	482	58	1	20	3	17	1	582

When examining the above tabulation, it should be remembered that the line of stations from which the balloons were released covers western New England and extends somewhat into New York, four being several miles west of the New England boundary, yet but forty of the recoveries came from New York State and these were mostly balloons which drifted a few miles. A very large proportion was returned from Massachusetts, as might be expected, and although only two stations were located in Connecticut, more tags were returned from that State than from New York State with its four stations. Of a total of 582, 472 were recovered from New England, another indication of the very general easterly drift.

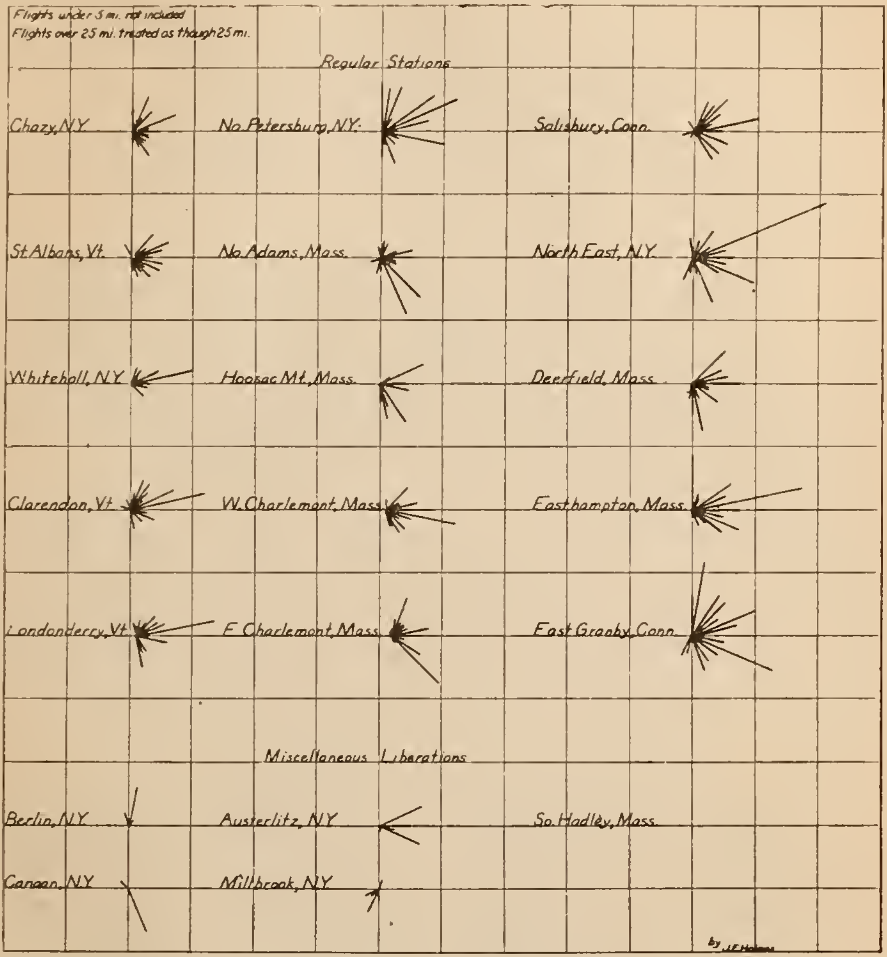


Chart showing balloon drift as obtained from returned tags.

The above chart shows balloon drift from the various stations, each being plotted from a central point. The lines to the right of the perpendicular indicate easterly drift. Note the very little westerly drift indicated by the very short lines to the left of the perpendicular. Balloons drifting over twenty five miles are plotted at 25 miles in order to eliminate the effect of long and relatively unimportant drifts. Those drifting less than five miles are not included. There were almost none westerly above this maximum.

Considerably more westward balloon drift was recorded in 1924 than in 1923, due largely to the greater number of balloon tags returned and partly to the better success in obtaining westward drifts from the miscellaneous liberations. However, the westward component, based upon the returned tags, was for 1923 less than 2 per cent and for 1924 less than one per cent.

Two-dram gelatine capsules nearly filled with gasoline, each with a wick of darning cotton designed to promote evaporation and thus offset in a measure loss of bouyancy, were inserted in the throats of 433 balloons for the purpose of securing a prolonged drift at a low altitude. Over 12 per cent of the tags were returned from one station, the average for the whole being 7.4 per cent. The drift of these balloons ranged up to 128 miles, the average being 42.5 miles.

Summary.— Our failure to locate any signs of the gipsy moth in the campaign conducted west of the barrier zone area this summer encourages us to believe that at least no serious infestations exist west of the Hudson River. Our wind dispersion records are also encouraging as this, the second year this experiment has been conducted, denotes practically a duplication of the records secured last year. Assistance of wind currents in preventing western spread during the early caterpillar stages seems to be prevalent.

We are still further encouraged by the fact that apparently, at this writing, all the gipsy moth colonies found during the past season's work have been completely exterminated. This, however, cannot be definitely determined until foliage conditions permit making a thorough examination of these areas again this season. Even though the hoped for extermination of these colonies has been accomplished, it does not indicate that the danger of an invasion of New York State by the gipsy moth is not still imminent.

There is still quite a large area in the Hudson Valley in which no inspection has been made. It seems reasonable to believe that conditions in the uninspected area will not be different than in the area inspected, in which were found gipsy moth colonies, some of which were of several years' standing and had reached a point where rapid increase in numbers would follow. It is also reasonable to believe that if the infestations found in the Hudson Valley during the past year had gone undiscovered for a few more years, a thorough infestation would occur over the entire valley and the adjacent western section.

According to the increase of infestation in other sections, that had reached a degree of severity of the largest found in the Hudson Valley this year, the above can be applied as facts — not assumptions.

The work of the United States Department of Agriculture in their part of the zone area, which is a strip some twenty-five miles wide, extending from the Canadian border to Long Island Sound along the western border of the New England States, has uncovered quite large and numerous colonies along our entire eastern boundary.

The New England States have uncovered still larger and more numerous colonies just east of the Barrier Zone line, all of which indicates that the most aggressive campaign in the history of the Gipsy Moth in the United States which was conducted during the past year cannot be abated if the further spread of the Gipsy Moth is to be prevented.

SUMMARY OF WORK IN THE GIPSY MOTH BARRIER ZONE AREA FROM SEPTEMBER 1923 TO JUNE 30, 1924.

COUNTY	Miles of road scouted	Miles of woodedge scouted	Shade trees inspected	Fruit trees inspected
Dutchess	337.38	331.35	161,286	149,098
Columbia	525.00	467.00	441,705	207,895
Rensselaer	940.63	845.15	952,812	301,071
Washington	1,185.25	543.98	1,175,010	202,498
Essex	145.00	8.50	30,329	42,441
Clinton	309.00	5.25	128,441	96,601
Grand total	3,142.26	2,201.23	2,889,583	999,604

County	Gipsy Moth Colonies Located	No. of Egg Clusters atColoonies
Washington	1	276
Rensselaer	4	198
Columbia	4	100
Dutchess	2	322
Total	....	896

SUMMARY OF WORK WEST OF THE HUDSON RIVER
SHOWING COUNTIES IN WHICH INSPECTION WORK WAS CONDUCTED

Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Clinton
Cortland
Delaware
Erie
Essex
Franklin
Fulton
Genesee
Greene
Hamilton
Herkimer
Jefferson
Lewis
Livingston
Madison
Monroe
Montgomery
Niagara
Oneida
Onondaga
Ontario
Orange
Orleans
Oswego
Otsego
Rockland
St. Lawrence
Saratoga
Schoharie
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Warren
Wayne
Wyoming
Yates

In the above some 376 miles of trail were covered in the Adirondack and Catskill mountain section and in addition, some 3,000 inspections were made at other important points. Approximately 131,000 shade and ornamental trees were inspected.

WHITE PINE BLISTER RUST

The campaign against the white pine blister rust in New York in 1924 was far more successful than in any previous year. This work has been conducted along the three distinct lines, viz: (1) protecting stands of white pine of sufficient commercial promise by pulling up and disposing of the currant and gooseberry bushes in and within 900 feet of the same. (2) Educating the people of various communities where white pine is growing commercially on the seriousness of white pine blister rust and securing the cooperation of white pine owners in stopping the further spread of this disease in their white pine woodlots. (3) Scientific investigations.

1924 Eradication.— The total area of white pine protected from white pine blister rust in 1924 is 25,262 acres, as compared with 15,459 acres in 1923.

The increase is 63 per cent. The total number of currant and gooseberry bushes destroyed was 1,032,964.

State Land.— The currant and gooseberry bushes were eradicated from 5,969 acres of State Forest Land located in the following counties in which the respective number of acres have been covered:

County	Acres	County	Acres
Fulton	28	Franklin	238
Lewis	1,240	Ulster	122
Saratoga	574	Hamilton	115
Warren	570	Delaware	400
Essex	2,580	Greene	102

The average cost per acre in these various regions was $3.42.

During the past season a special effort has been made to protect the white pine on parcels of State land outside of the Adirondack Park, chiefly because it has been difficult in some sections to obtain the cooperation of private owners in protecting their white pine unless State land was eradicated. It was necessary as in former seasons to maintain the crews of men working in the Adirondack preserve in camps.

Privately Owned Land.— A total of 19,293 acres of privately owned land as contrasted with 9863 acres in 1923 was eradicated in the following counties, in which the number of acres of white pine protected are:

County	Acres	County	Acres
Columbia	342	Saratoga	2,858
Rensselaer	295	Washington	1,652
Dutchess	306	Essex	3,332
Ulster	1,506	Warren	1,989
Greene	96	Clinton	1,297
Delaware	669	Lewis	800
Schoharie	418	Otsego	791
Fulton	1,857	Broome	167
Hamilton	128	Oneida	790

The percentage of increase in the amount of privately owned white pine which was protected from white pine blister rust over that of 1923 is 92 per cent. This increase in the amount of land eradicated is explained by the following facts: (1) Better methods of field work. (2) Better and more extensive methods of education. The total number of currant and gooseberry bushes pulled on privately owned land was 594,995. The average cost per acre of eradication on private land was $1.18.

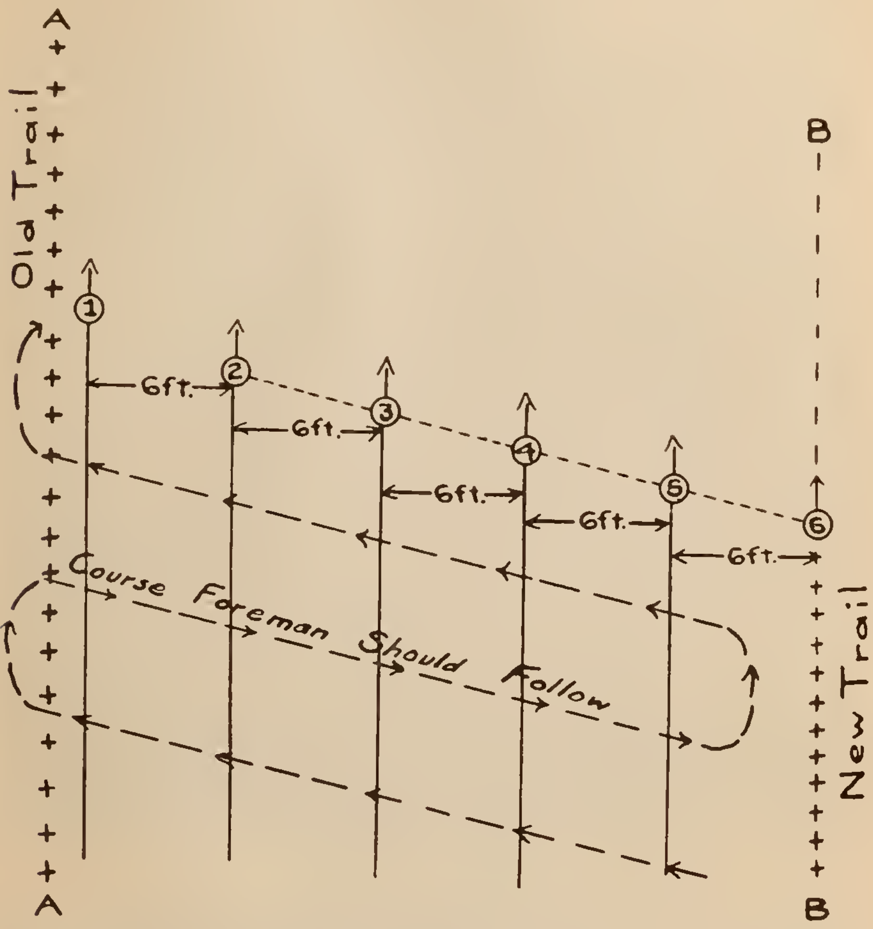


Diagram showing position and direction and strip covered by each man in a ribes eradicating crew.

New Eradication Method.—Early in the season a better system than that in previous years of positioning the men in the crew while at work was devised. The position of the men in crew formation is illustrated in accompanying photograph. The explanation is as follows: A is the outside boundary line (old trail) of the preceding eradication strip, the boundary of which is marked by two inch squares of white paper stuck on twigs of shrubbery and trees or one inch squares of white paper dropped intermittently on the ground or a combination of both. Blazing of trees is not allowed. In case an owner does not desire the use of the "paper trail" (as it is known) strips of red cloth as trail markers are hung on twigs and which are removed on the return eradication trip. Man No. 1 is head linesman and he follows the trail which was made on the preceding eradication strip. He walks two or three feet inside of this trail and covers the strip of ground five to six feet in width. Man No. 2 walks five to six feet to the side and three to five feet behind man No. 1 and guides on him. Man No. 3 walks five to six feet to the side and two feet behind Man No. 2 and guides on him. The position of Man No. 4 with reference to Man. No. 3, is the same as Man No. 3 is to Man No. 2. Man No. 5 has a similar position with reference to Man No. 4 and Man No. 6 is similar in position with reference to Man No. 5. Man No. 6 becomes the headlinesman, guiding the crew on the trail he has marked and Man No. 1 marks the new trail. The foreman walks not less than five feet behind the crew and checks on each man and sees that the men are in proper formation and that no bushes are missed. A foreman leaving his crew at any time without permission from the man in charge of the work or permits loafing is subject to dismissal from the service. To insure efficiency and speed, the work of the crews is checked at most every two days. No area of white pine from which the ribes are eradicated is pronounced sufficiently protected from blister rust until it has been thoroughly checked by a specially trained man for this work. When areas of white pine are protected from blister rust under the supervision of State trained and employed foremen, the Conservation Commission guarantees that the work will be satisfactorily done.

Training of Foremen and Checkers.— A great drawback to the progress of the field work in the control of blister rust in New York has been the lack of sufficiently trained crew foremen and proper crew management. In May, 1924, a two weeks field training school for the training of blister rust crew foremen and for the training of men to have close supervision over these foremen, was held before the eradication work began. There was a total of fifty men in training at this school. Although the majority of them qualified for positions there were not a sufficient number to meet the demands for eradication work.

The increase in the efficiency of these men as the result of the training received at this school has contributed quite materially to the large acreage and the thoroughness of ribes eradication and have, judging from the comments of private cooperators and others, greatly increased the prestige of blister rust control work in New York in 1924. These results are so far reaching that a similar school is planned to precede the field work of 1925.

Poor Results Obtained when Proper Methods are not Used. — As in 1923, a number of private owners have attempted to pull the ribes bushes in their tracts of white pine without an assistance from the Conservation Commission. With one possible exception, to our knowledge, this work has not been done sufficiently to protect the pine from the further spread of blister rust. This work was done by a haphazard walking through the woods. Some individuals were not able to recognize all the species of ribes bushes occurring in their woodlots. In most cases not over twenty-five per cent of the bushes were pulled. Ribes are likely to occur in the most unexpected places. In one instance the owner after pulling the bushes threw them down on the ground. Ribes bushes left on the ground often take root. In many cases the owners in pulling the bushes left the crowns or roots in the ground which have sprouted.

The toll of one Gooseberry bush which is marked by white flag, 4 dead pines, one dying. All others have blister rust and will die.

Except in rare conditions every foot of ground should be systematically covered in protecting a white pine woodlot from blister rust. With the possible exception of very small areas, the owner's time is too valuable to attempt such a task alone and should at least have some directions from a trained and experienced man. If the spread of white pine blister rust in a white pine woodlot is to be stopped, there must be a thorough eradication of the ribes bushes in and within 900 feet of the same. This work is most economically done, possibly with rare exceptions, by the crew method under the direction of a specially trained and experienced foreman.

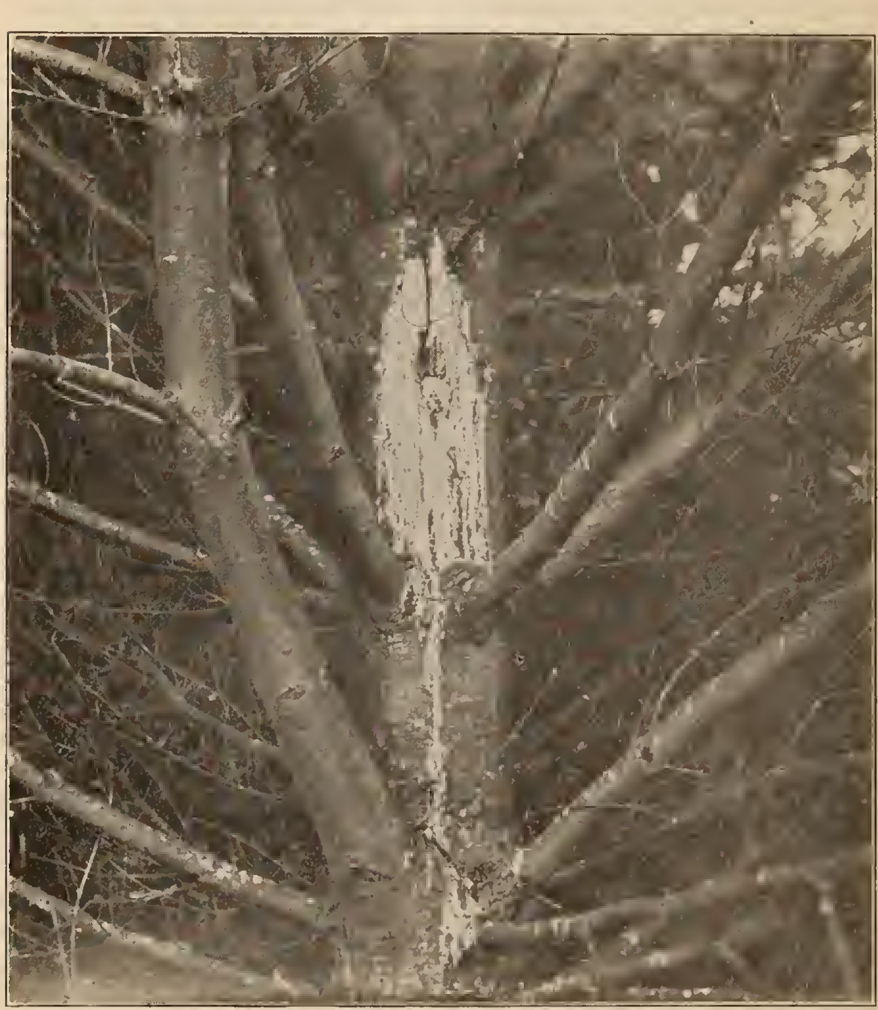
Educational Work.—The Conservation Commission is protecting the white pine on Forest Preserve lands from this disease. Owing to the value of white pine as timber crop and the increasing cost of lumber, due to increase shortage, the deadly nature of white pine blister rust and the difficulties involved in fighting this disease single handed, it is essential that the state should assist the private owner in protecting his white pine from blister rust. An extensive and intensive campaign of education on the nature and seriousness of white pine blister rust is being conducted with the cooperation of the Federal Government. The State furnishes free of charge to any white pine owner, trained supervision in the eradication of the ribes bushes in and within 900

A wild Gooseberry bush near Johnsburg, Warren County, N. Y. Typical of the kind of holes in the pockets of many New York white pine growers.

feet of his white pine. Before this work is undertaken the State will also supply a man free of charge who will examine an owner's white pine woodlot and determine the advisability of eradication and the approximate cost of eradicating the ribes. When the owner is ready to protect his pine, he secures men for a crew or authorizes the man in charge of blister rust control work in his section of the State to secure the necessary labor. The owner pays the wages of the men who work in the crew, but the State supplies and pays for the wages of the foreman. It might seem at first thought that the land owners bear the greater burden of the cost of eradication. But when the total costs of protecting his white pine from blister rust are taken into consideration, the land owner does not bear more than 60 per cent of the cost of this work. It is understood that the foreman shall have full charge of the crew while in the field, otherwise the Conservation Commission does not cooperate with a white pine owner in ribes eradication.

White pine blister rust is a subtle disease. It is so deceptive that from the very beginning of the fight to check the further spread of white pine blister rust, the majority of white pine owners have not realized how serious it really is. The most deceptive features of this disease are: (1) After entering a white pine tree its presence is not easily recognized under a period of two to three years and only then by the eye of a trained observer. White pine blister rust may incubate so slowly in a white pine tree as not to be noticeable for a period of five to ten years. (2) Blister rust kills every tree upon which it obtains a foothold, but a period of five to ten years or even more may elapse before the tree is killed, depending largely upon its size and the place at which it was attacked by the disease. The above characteristics of white pine blister rust are so deceiving to many white pine owners that they believe their white pine trees are perfectly healthy, and they may appear to be, when as a matter of fact, they are badly diseased with blister rust and doomed to die. (3) Natural seeding of white pine can not succeed where there are ribes infected with the white pine blister rust. The presence of such bushes in wood lands and other areas are responsible for the death of many millions of seedling white pine. Many land owners apparently do not recognize this situation. Furthermore, they do not seem to realize the vital necessity of an adequate supply of timber for the future.

In view of the facts as set forth above, Federal and State authorities have recognized that if the white pine growers are not educated to the seriousness of white pine blister rust and given some trained assistance in controlling the spread of this disease, the commercial growing of white pine in sections where there are ribes will ultimately cease. An appropriation for educational work and scientific investigations on white pine blister rust was made by the Federal government, a portion of which was allotted to the State of New York. Since a certain amount of this money is being spent for educational work, the Secretary of Agriculture, the States Relation Service (acting through the Farm Bureau organization) and the Conservation Commission have entered into a cooperative agreement for conducting an educational program among land owners to convince them of the seriousness of white pine blister rust and the fundamental necessity of protecting their white pine from this disease.



A large white pine being girdled by blister rust and will die. Blister rust entered the trunk of this tree through the small branch near the center of the place where the disease is now located.

Blister Rust Control Agents.—The educational work on the control of white pine blister rust is conducted directly by eleven blister rust control agents. These men with a few exceptions are forestry graduates. Their salaries and traveling expenses are paid from the allotment of the Federal appropriation to New

York. These agents work under the immediate supervision of the Conservation Commission in carrying out the plan of work which has been jointly approved by the United States Department of Agriculture, the Extension Department in Cornell University and the Conservation Commission. The blister rust control agents are directly responsible to the Forest Pathologist in the Conservation Commission, in all their educational activities. They are in direct charge of educational work in the district to which they are assigned. The blister rust control districts are as follows:

District No. 1. Columbia, Dutchess, Greene and Ulster Counties.
District No. 2. Schoharie, Otsego and Delaware Counties.
District No. 3. Montgomery, Fulton and Hamilton Counties.
District No. 4. Washington and Rensselaer Counties.
District No. 5. Saratoga County.
District No. 6. Warren County.
District No. 7. Essex, Clinton and Franklin Counties.
District No. 8. Lewis, Herkimer, Oneida and St. Lawrence counties.

The blister rust control agents are officed with the County Farm Bureau Agents with two exceptions where the regions of the greattest acticity of the blister rust control agent are too remote from Farm Bureau headquarters. The close association of the County Farm Bureau Agent and the blister rust control agent has proven quite beneficial not only in promoting the educational work on blister rust control, which is in reality extension service, but also farm forestry. The County Farm Bureau Agent is very helpful in assisting the blister rust control agent in methods of educational work and in getting acquainted with the land owners. Since farm forestry is becoming one of the important projects of the County Farm Bureau Agent, the blister rust control agent becomes a source of assistance to him.

Avenues of Publicity.— The educational work in blister rust control is conducted chiefly through the public press, talks illustrated with motion pictures and other public address, field demonstrations, roadside demonstrations, exhibits at fairs and picnics window displays, private interviews and the distribution of bulletins and circulars. Since January 1, 1924 the blister rust control agents have published 277 articles, given 150 public addresses, held 281 field demonstrations, had 86 exhibits at fairs, picnics and window displays, made 1,844 interviews and distributed 22,556 bulletins.

The most important way of reaching white pine owners is by private interviews. The greater portion of an agent's activities are devoted to this particular phase of educational work. He must have certain information concerning the white pine woodlot, before interviewing the owner. The agent must know the approximate cost of eradicating the ribes and whether such an expenditure of money is warranted. Most land owners have little or no conception of the possibilities of their white pine woodlots. In such cases the agent must first study the forestry of the woodlot, that he may be in a position to help the owner to appreciate the value of his white pine woodlot and the benefits to be derived by protecting it from blister rust.

Owing to the fact that private owners must often be made to appreciate the value of their white pine woodlots before they can understand why their white pine should be protected from blister rust, often requires considerable time but the blister rust control agent is really doing a work which is foundational to a broader phase of forestry and one that must ultimately be scientifically directed and practiced, namely, farm woodlot management. Although the blister rust control agent is devoting his time to the control of white pine blister rust, being a forester, he is so situated that he can render a direct service in stimulating an active interest in reforestation, farm woodlot management and the general forestry program of this State and of the United States.

YOU CAN STOP THE SPREAD OF BLISTER RUST
PULL UP AND HANG UP THE CURRANT AND GOOSEBERRY BUSHES WITHIN
600 TO 900 FEET OF YOUR WHITE PINE
LIVE CURRANT AND GOOSEBERRY BUSHES
WHEN LEFT ON THE GROUND OFTEN
SPROUT

Sure way to stop blister rust. Conservation Commission's exhibit at the Forestry Field Day, DuMond Farm, Delaware County.

Regulatory Work.— The blister rust control agents have charge of the eradication of ribes on private land in their districts.

For this work they are directly responsible to the state leader in ribes eradication, who is a Federal employee and who is under the direction of the forest pathologist. Owing to the necessity of speeding up ribes eradication work, which must be preceded by an intensive campaign of education, it became necessary to relieve the blister rust control agents of the greater amount of the immediate supervision of ribes eradication. During the season of eradication the blister control agent was given an assistant, known as an assistant in eradication and who was a State employee. The eradication assistants are experienced woodsmen and thoroughly capable of supervising the eradication work. The work of these assistants consisted of helping organize the crews, supervising the foremen, checking the work of the crews, determining the acreage of the eradicated areas and helping the agent in getting information on white pine woodlots, preparatory to interviewing the owners. By making it possible for the blister rust control agents to devote the greater amount of their time to educational work and at the same time providing a closer supervision of the ribes eradication, has in no small degree made possible, as previously stated, the large increase in acreage eradicated in 1924.

State Appropriation.— The appropriation made by the State for blister rust control work in 1924 was utilized as follows: (1) The eradication of current and gooseberry bushes on Forest Preserve land. (2) The training and employement of foremen who had charge of the crews that worked on State and private land. (3) Training and employment of eradication assistants who had immediate supervision of the foremen on private land and checking their crews.

Scientific Investigations.— The scientific investigations have been continued along the same lines as in 1923 in addition to studies on certain phases of the oecology of Ribes.

Damage Studies.— The work of 1924 was a continuation and enlargement of that of 1923. Many of the damage study plots laid out in 1923 were not on a permanent basis. This past summer as many of these as possible were made permanent.

Three plots laid out in 1923 in Warren County were reworked. Two new plots were laid out in 1924 in Warren County and 1 plot in Essex County.

In the reworked areas data were taken on individual cankers to note progress of disease in future years, with reference to life of individual tree.

On the Horicon plot there is one point of special consideration; namely, that in 1923 12% of stand was dead. In 1924, an increase of 60% in the death of the trees in the plot was noted.

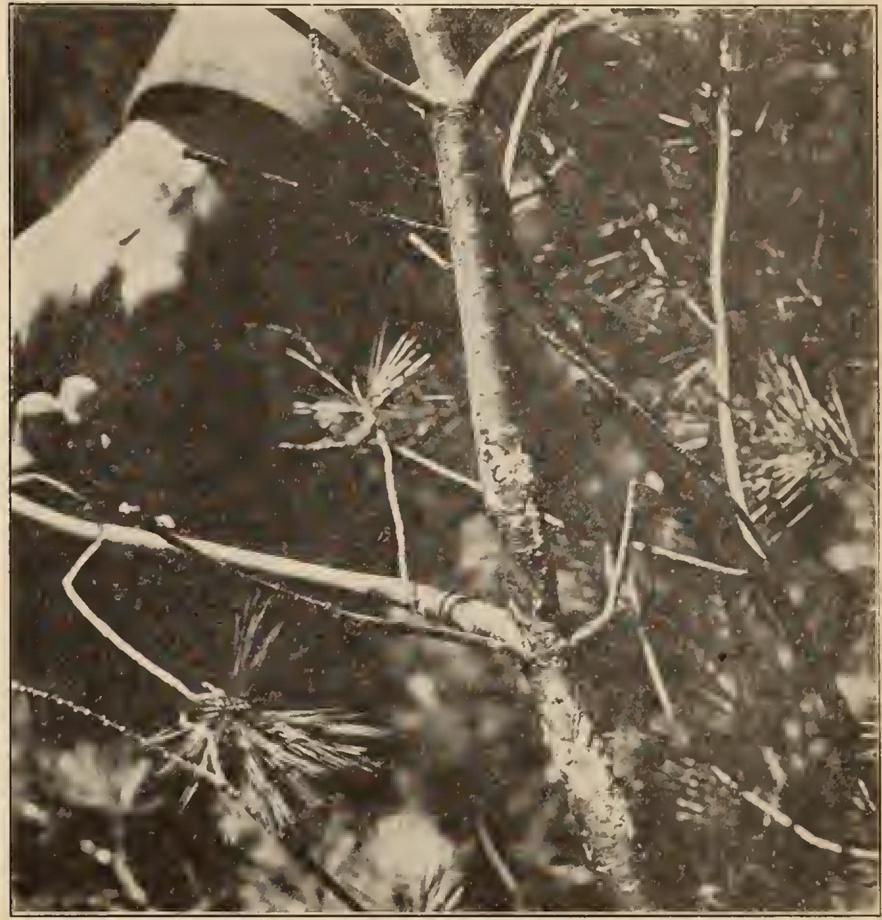
At Kelm Mt. a final check of trees showed 96% of trees infected.

The data obtained may be summarized in the following statements; Of 20,000 trees examined, over 1000 or 5% are already dead. Over 5000 are now diseased, or 25%. Outside of one plantation, the study of which was undertaken for other than damage studies, the percent of infection is 36%.

Trees with cankers endangering their lives within 10 years number about 17%. These are trees with cankers on branches 3 inches or less from boll of tree.

This means that with the 5% already dead from blister rust, 22% or nearly a quarter of the trees, on the lots studied, will be dead in between 5 and 10 years.

There are 3 cankers per infected tree, as an average.



Blister rust on a small white pine branch gradually working its way down to the trunk of the tree which will be girdled and killed, near Horicon.

Fifty-seven percent of the cankers studied were on 1919 wood. It is probable that over 60% of all blister rust in the Adirondacks was of 1919 origin. This was a year of favorable weather conditions for the spread of the disease.

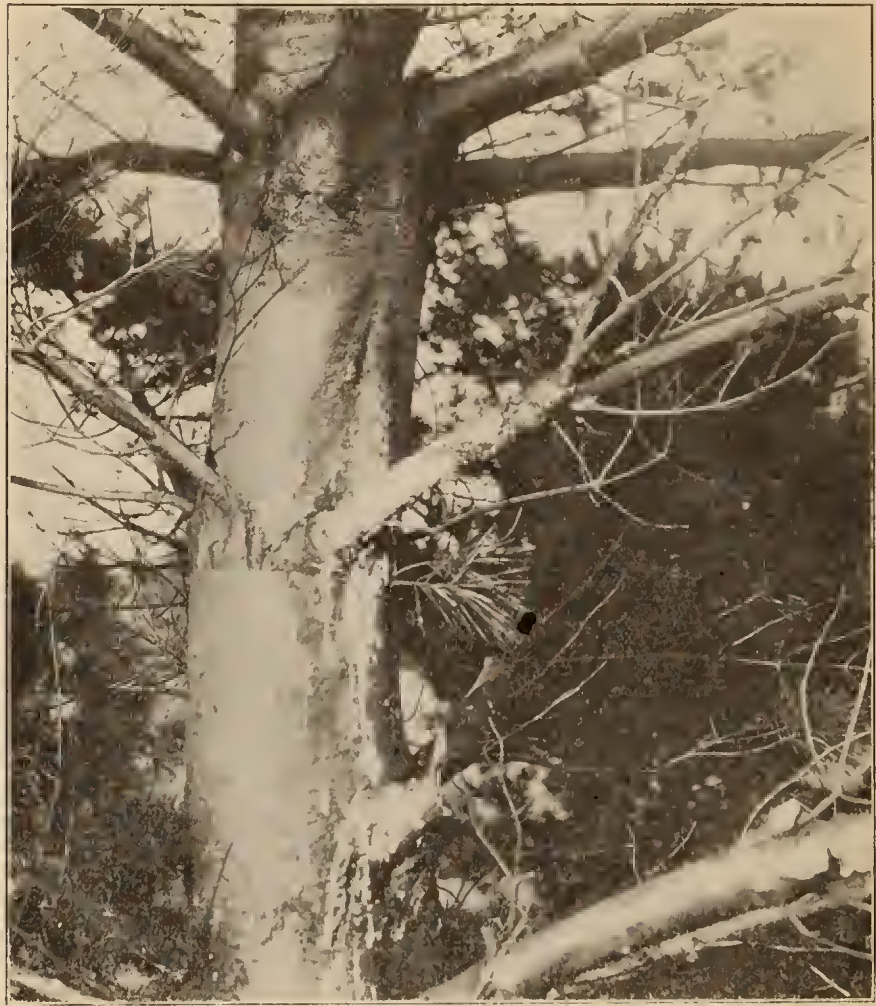
From data obtained on several plots the observation is made that 75% of normal trees are diseased, and only 35% of the suppressed, shaded and blighted trees, are diseased. This shows that the blister rust attacks the normal and healthy trees more readily than the poorer trees.

Observation made on squirrel injury shows that 41% of the cankers on the plots are squirrel chewed, and this locally reduces the volume of spores produced, altho it is noted that the rodents do not destroy the cankers completely and do not attack enough of the trees to be of much material help in checking the spread of tho disease.

Reproduction of Ribes.— (1). A study of the percentage of the sprouting of seeds of ribes under different field conditions, the ability of the seedlings to survive these conditions and their rate of growth. (2). A study of the sprouting from roots of ribes left in the ground when the bushes are pulled. It is well recognized that in pulling the bushes, roots which break off near the crown of the bush and left in the ground very often sprout. No definite data are at hand on the extent to which such roots may sprout and the rate of growth of the sprouts. (3). The laying out of permanent quarter acre plots under different œcological conditions in tracts of white pine from which the ribes were eradicated in 1924 for the purpose of determining the future years how readily ribes become reestablished and how long after the ribes are eradicated from a tract of white pine it will be, if ever, until reeradication will be necessary.

Unfortunately there is very little data available on the reestablishment of ribes in eradicated white pine woodlots such as reseeding, the rate of growth of seedlings and sprouting from roots left in the ground. One of the questions most frequently asked by the private owner of the blister rust agent is "How long before it will be necessary to reeradicate the ribes from a tract of white pine?" We do kno wthat when the current and gooseberry bushes have been thoroughly eradicated the further spread of blister rust stops. But we are not in a position as yet to state just how often reeradication will be, if at all, necessary. It is apparent that reeradication, if essential, need not be done in less than five to ten years and where necessary, need not be done more than once. It is also evident that in the greater part of the white pine belt of New York that only one eradication will be needed to sufficiently insure a commercial stand of white pine.

Blister Rust and the Growing of White Pine.— Eight years experience in the eradication of ribes bushes from white pine woodlots in New York as well as in the Northeast shows conclusively that the expense involved in this work does not make the cost of the growing of white pine impracticable. There has been a steady increase in the stumpage values of timber in the past thirty years and with the steady decrease of our timber, the stumpage values of this crop are bound to be in excess of what they are today, thirty years from now. According to recent data from the U. S. Forest Service we are consuming timber four times more rapidly than it is being grown. In New York we are using twenty times the amount of timber that we are producing. There is a shortage of more than a million homes in our country today. The majority of the dwelling houses which are being built would be scoffed at by our grandfathers, because of the poor quality of lumber used and because they are not large enough to accommodate an average sized American family. These facts alone should be more than enough to convince citizens that a woodlot no matter how young the trees or what kind they may be, is an asset to be highly prized



White pine near Horicon, Warren County, N. Y., being girdled by Blister Rust. The disease entered the tree in 1918 through the leaves of the dead limb on right.

and cared for — not neglected. Again the above facts are such that they should arouse an owner to reforest the worn out or denuded land he has instead of holding it as a liability and paying taxes on property from which there is little or no return. Timber is a crop for which there are bound to be increasing demands, at the rate it is being consumed in America today. No landowner who has a crop of growing white pine can afford not to protect it from blister rust. Much of the idle land in New York once grew white pine and will do so if planted to this species and protected from blister rust. The eradication of the currant and gooseberry bushes from land before or very soon after it is planted to white pine does not make the cost of the planting prohibitive. The future expense of protecting it from blister rust, if necessary, judging from all facts at hand, will be a very small item in the total cost of producing the crop.

Summary and Recommendations.— The total acreage of white pine protected in 1924 is almost three times greater than in 1923. The increase in acreage of private land under State supervision is 92 per cent. Through reorganization of our field forces, improving our methods of eradication and better training of crew foremen, the training and employment of assistants in eradication, our system for controlling the spread of blister rust is the best yet devised by any state attempting to control this disease, and is absolutely effective wherever applied.

Our scientific investigations of the past two years show that white pine blister rust control has made rapid progress in New York than was formerly believed. Its further spread has stopped where the ribes bushes have been eradicated. These bushes are as dangerous as can be to white pine and the sooner they are removed the less the damage from blister rust will be.

Even through our present operations for controlling the spread of white pine blister rust are effective, they are not conducted on a sufficiently broad scale when we remember that there are between 300,000 and 400,000 acres of white pine land yet to be protected. The longer this white pine remains unprotected the greater the damage from blister rust will be.

It is therefore recommended that measures for checking the further spread of white pine blister rust be greatly increased.

STATE FOREST POLICY

The Empire State has, it well might be said, always been the leader in State forestry work. In order to maintain a lead it is necessary to continue a progressive policy that is one which changes to meet new situations. Forest fire protection has been established; reforestation has been developed to a point where decided increase in the nurseries is necessary in order to supply planting stock. Questions have been raised as to amendment to the Constitution to permit lumbering on State land. The latter has caused a great deal of discussion and there has been a decided difference in opinion.

In order to attempt to bring together all the various organizations in the State interested in forestry, a conference was called at the summer school of the State College of Forestry at Cranberry Lake last summer. At this meeting there were representatives of the State College of Forestry; New York Section of the Society of American Foresters; The Association for the Protection of the Adirondacks; the New York State Fish, Game and Forest League; The New York State College of Agriculture; The State Department of Forestry at Cornell; Syracuse University; Adirondack Mountain Club; the Conservation Commission; the State Council of Parks, together with Senator Ellwood M. Rabenold, Chairman of the Senate Committee on Conservation. Senator Rabenold presided. Mr. R. H. Torrey, Secretary of the State Council of Parks acted as secretary.

Senator Rabenold explained that the purpose of the meeting was to take steps to formulate a progressive forest policy for New York State, in the absence of legislative action. He cited the bill offered by Senator Straus in 1921, providing for the official regulation of timber cutting on privately owned land within the Adirondack Park, through which, had it passed, the State might have exercised its police power to prevent denudation of lands within the blue line.

In the following year, Senator Rabenold presented a bill in almost the same form, but with some changes in the language to ease the fear of confiscation, by permitting resort to the Court of Claims. This bill was not reported out. In 1924, on the first day of the session, this bill was reintroduced and reported out, but failed of passage. A conference was then called in New York city attended by Senator Rabenold, Ferris J. Meigs, President of the Empire State Forest Products Association; John G. Agar, President of the Association for the Protection of the Adirondacks, Samuel J. Ordway and Assemblyman Kaufman. It was agreed to draft a bill to establish a State Forestry Commission, to serve for one year only, for the purpose of formulating a comprehensive State Forestry Plan, including the regulation of timber cutting, this commission to report to the Legislative session of 1925. Mr. Meigs wished to have a section in the bill to include all lands, public and private, in such regulation, on the supposition that cutting might eventually be permitted on state lands, but Senator Rabenold said, friends of the Adirondacks could not agree to any such provision, and Mr. Meigs finally acceded to the majority view as to the bill to be drafted.

Immediately after the bill was introduced, a hearing was held before the Senate Conservation Committee at which A. B. Recknagel, of Cornell, secretary of the Empire State Forest Products Association, opposed the bill, on the ground that there should be no limiting of cutting timber on privately owned land unless an equivalent amount of cutting be permitted on state land.

The bill provided for a State Forestry Commission to be made up of the following, to be appointed by the Governor: representatives of the New York State College of Forestry, Syracuse University; New York section, Society of American Foresters; Department of Forestry, Cornell University; New York State Forestry Association, Association for the Protection of the Adirondacks, Empire State Forest Products Association and the Conservation Commission.

The measure was reported out of the Conservation Committee, but had to be referred to the Senate Finance Committee, because it carried an appropriation of $5000; it was not reported out of the Finance Committee.

Senator Rabenold urged that since this bill had failed of adoption, citizens representing such agencies as were included in the meeting should get together and carry on efforts for a forest policy, with an energetic unofficial commission and such sub-committees representing various aspects of the problem.

Dean Moon said that he was in accord with Senator Rabenold's views as to the need for a definite forest policy. He recognized that public opinion was against logging on state land, and said he thought that a plan for the study of the problem on land other than state land was a step in the right direction. He said that the committee on legislation of the Society of American Foresters, had drafted a bill for an unofficial, unpaid, forestry commission, to consider the matter of cooperation with federal authorities under the Clarke-McNary bill.

Prof. Hosmer, speaking for the New York Section, Society of American Foresters, as well as for Cornell University, said, that a New York State forest policy had been discussed at the last annual meeting of the Section. He said that members of the Section were agreed that something ought to be done promptly in view of the adoption of the Clark-McNary bill, providing for federal cooperation with the states. There are several non-controversal matters, on which all sides could agree, such as a state wide forest fire service, including counties outside the Conservation Commission's control; juster forms of forest taxation; a state wide survey of land and extension of the state nurseries for larger service in reforestation. Regulation of the private timber land owners, he suggested, could be left for subsequent discussion.

Senator Rabenold urged that some kind of a fighting body representing every interest for the protection of the Adirondacks, should be formed, to stir public interest and to serve as a clearing house for information and direction of public opinion.

· Dr. Hall moved that some sort of an organization, patterned after the Commission proposed in Senate Bill 1528, Session of 1924 (Senator Rabenold's bill), be formed. A committee on organization, was named by Senator Rabenold, consisting of himself, Dean Moon, Prof. Hosmer, Dr. Hall and Mr. Pettis. This committee convened and reported in the afternoon.

At the beginning of the afternoon session, Senator Rabenold said that it was desired to invite the cooperation of many other organizations in the state, especially the agricultural interests, and that the cooperation of the lumber interest would be welcomed, since it was to be hoped that they would join in the effort to establish a working forest policy, because of intelligent self-interest. This could be done when a definite forest policy can be formulated. For the present, he suggested that in addition to the seven official and unofficial bodies named in his bill, such others as the New

York State Fish, Game and Forest League, the State Council of Parks, the New York State Association, the New York Conservation Association, and the Committee to Prevent Exploitation of the Adirondacks, be included. Representatives of various large lumber and paper interests might also be added.

The secretary then read the report of the committee on organization, as to the name and scope of the proposed forest policy committee. Name to be: Committee on Forest Policy for New York State. Senator Rabenold was named as Chairman of the General Committee; Raymond H. Torrey, secretary.

Subjects to be taken up at once, as non-controversial, and on which sub-committees were to be named: 1. State-wide fire protection; 2. Reforestation; 3. An economic survey of the state; 4. Just forest taxation; 5. Coordination with federal activity; 6. State forests outside forest preserve counties; 7. Maximum continuous forest production.

It was moved by Mr. Jesup and seconded by Mr. Hall that this report, as to the name of the organization and the nature of the sub-committees, be adopted, and this was done. The meeting then proceeded to the selection of a tentative membership of these committees, to be confirmed by correspondence by Senator Rabenold and others. Those committees were named as follows:

1. *Fire Prevention.* R. S. Kellogg, News Print Service, New York City, Chairman; C. C. Delevan, State Forest Rangers School, Wanakeena, N. Y.; William G. Howard, Assistant Superintendent State Forests, Albany, N. Y.

2. *Reforestation.* John N. Carlisle, President Northern New York Utilities Co., Chairman; Henry M. Sage, President New York State Forestry Association, Albany; Prof. Samuel N. Spring, Cornell University; Clifford R. Pettis, Superintendent State Forests.

3. *Economic Forest Survey.* Prof. W. I. Myers, State College of Agriculture, Cornell University, Chairman; Prof. H. C. Belyea, State College of Forestry, Syracuse; Prof. Chas. A. Taylor, New York State College of Agriculture, Cornell University.

4. *Forest Taxation.* Samuel H. Ordway, Association for Protection of the Adirondacks, New York City, Chairman; George N. Ostrander, of Finch Pruyn Co., Glens Falls, N. Y.; O. M. Porter, Woodland Dept. American Paper and Pulp Association, New York City.

5. *Coordination with Federal Activities.* M. C. Burritt, Hilton, N. Y., Chairman; Barrington Moore, New York City; Chauncey Hamlin, Buffalo.

6. *State Forests Outside Forest Preserve Counties.* Mark N. Bump, State Fish and Game League, Binghamton, Chairman; Burdett Whipple, Salamanca; A. S. Hopkins, Conservation Commission.

7. *Maximum Continuous Forest Production.* Dean Franklin Moon, New York State College of Forestry, Syracuse University; Prof. Ralph S. Hosmer, Cornell; Richard M. Jesup, Adirondack

Mountain Club. Cranberry Lake; Ferris J. Meigs, Empire State Forest Products Association, New York City; Prof. A. B. Recknagel, Cornell University; Louis Marshall, and John G. Agar. (Chairman to be selected by the Committee.)

The next meeting was held at Utica on November 12 and 13. On the first day there were meetings of the various sub-committees and during the evening a meeting of the general committee, at which the following report was adopted:

Reports of sub-committee and actions thereon by the general committee were as follows:

(1) The sub-committee on Fire Prevention through R. S. Kellogg, New York City, chairman, proposed an amendment to subdivision two of section 52 of the Conservation Law, striking out the words: "Where there are contiguous areas of forest land aggregating 75,000 acres or upwards." This would give the Conservation Commission state-wide control of forest fire prevention, not exclusive, however, of the localities.

This recommendation was adopted by the general committee. The committee also adopted a resolution urging:

(a) Strengthening of the supervision by the Conservation Commission over the appointment and fitness of fire wardens.

(b) Extending the power of the Governor to proclaim the exclusion of hunters, campers and others from forest areas throughout the State.

(c) A general campaign of education for the public in preventing forest fires.

(2) The sub-committee on Reforestation through John N. Carlisle, Watertown, chairman, offered a resolution that the capacity of the forest nurseries be increased so that thirty-five million trees will be produced during the year 1934; this to be attained by the increase of two million five hundred thousand trees per year; that the State appropriate $35,000 for this work to be made immediately vailable to cover expenditures for the balance of the present fiscal year, and that $100,000 be appropriated for the ensuing fiscal year; and that within the next ten years twenty-five thousand acres of the land in the forest preserve in need of reforesting be replanted.

Resolutions were adopted by the general committee approving each of these recommendations.

(3) The committee on Economic Forest Survey through Prof. W. I. Myers of the State College of Agriculture, Cornell University, recommended that as a first step all data pertinent to this problem that has been gathered by various State, Federal and private agencies should be assembled.

This recommendation was adopted by the general committee with the request that the sub-committee make such a review of the forest survey data and report for further instructions from the general committee.

(4) The sub-committee on Forest Taxation, through O. M. Porter, New York City, chairman, reported that it will make a constructive report after its membership is completed by a representative of the lumbermen's interests.

The general committee adopted a motion requesting the subcommittee to work out a plan whereby newly planted forests growth shall pay a yield tax and standing timber shall not be subjected to pressure as to cutting by the piling up of taxes.

(5) The sub-committee on coordination, with Federal activities, through Mr. Harrington Moore, New York City, reported that it was in consultation with Colonel Greeley, head of the National Forest Service, whose ideas as to the most important subjects for Federal and State cooperation comprise: More stable organization of fire protection forces, farm planting, and education in farm forestry in backward states. Mr. Moore said that Mr. William G. Howard, Asst. Superintendent of State Forests, had advised him that the only change in the New York State Conservation Law to facilitate Federal cooperation would be a slight one in sub-division 34, section 50.

(6) On the subject of State Forests outside the forest preserve counties the general committee adopted a resolution that the combination hunting, fishing and trapping license be adopted by the coming legislature so that approximately $400,000 yearly may be available from this license to purchase State lands for demonstration forests, the establishment of which was approved by the committee.

(7) Upon the motion of Mr. Carlisle the Chairman of the general committee was directed to appoint another sub-committee to encourage the establishment of forest plantations in local subdivisions of the State, cities, towns, counties and school districts.

The meeting was continued the following day as a part of the program of the meeting of the Empire State Forest Products Association. There were very complete discussions of the various problems presented. A great deal of progress has been made during the course of these three meetings in regard to consolidating the interest of the various organizations who are more or less dependent upon a proper forest policy. It is believed that these meetings are only a beginning of what will result in working out a full program of forestry of the State.

REFORESTATION

By C. R. PETTIS,

Superintendent of State Forests

The growing of trees was once considered so much a natural incident that no one gave this subject any concern. During the last two decades we have been learning that our original wood supply is rapidly vanishing and that if we are to have a necessary timber supply, we must take steps to insure the growth of wood crops. Most of us have seen forests produced without effort. It, therefore, seems like a task or tax to go to the effort of growing wood. To do so, it at first appears as a problem, but if we stop to think, it is not a difficult matter. If Nature can do it unassisted, why cannot she do it more efficiently with our aid. The same idea of production has been applied in the use of our agricultural lands and thereby we have obtained increased production of food crops. The same idea can be used and the plan must be invoked in order to increase our wood supply.

The forces of Nature are well known and constant. Reforestation is, in plain words, making a forest grow on land which is now idle and can not profitably be used for agriculture. It simply means the setting of trees on these idle areas and then Nature will do the rest, if we protect the plantation from fire, insects and fungus diseases.

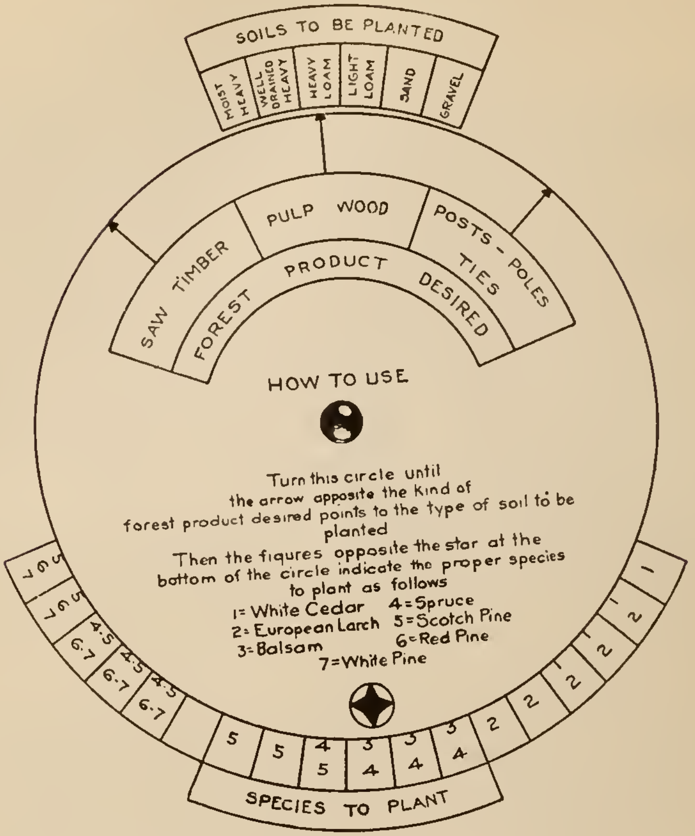
Nature establishes forests by the very generous but wasteful distribution of tree seeds upon lands which are both fit and unfit for tree growth. Science discloses that the great problem in growing trees is largely like increasing the human race. The germination of the tree seed and the development of the tree from the seed until it is large enough to compete with other vegetation surrounding it in its immovable position, is similar to the possibility of a human baby, or a baby wild animal, surviving their juvenile period without any aid from its parents.

A little observation will disclose the enormous loss of plant and animal life under wild conditions during their first few years of life. Only a few survive and become strong. These we observe as the dominant tree of the forest. It is those that succeed that attract our attention. If we study the environment and apply the laws of Nature, we can easily grow forests successfully. We can reproduce forests by using the forces of Nature better than Nature can do it without our help.

The great problem to overcome in reforestation is the idea that in certain cases, Nature at her best has, under our observation, made so many failures. This observation is justified and based upon the fact that forests have not reproduced as they should.

The whole difficulty is on account of the lack of care given to the young trees. We would not attempt to grow corn or some other valuable crop without giving it such care and cultivation that would insure the growing crop a reasonable opportunity to

TREE PLANTING INDICATOR



HOW TO USE

Turn this circle until the arrow opposite the kind of forest product desired points to the type of soil to be planted

Then the figures opposite the star at the bottom of the circle indicate the proper species to plant as follows

1 = White Cedar
2 = European Larch
3 = Balsam
4 = Spruce
5 = Scotch Pine
6 = Red Pine
7 = White Pine

SECURE THE GREATEST RETURNS
BY REFORESTING IDLE LANDS
WITH THE SPECIES
BEST SUITED TO THE SOIL

CONSERVATION COMMISSION - 1924

Tree planting indicator prepared by the Conservation Commission to aid in the selection of trees for reforesting suited to various soils in New York State.

compete favorably with the wild weeds surrounding it. We know that the corn, if cultivated, will soon overtop its competitors and develop into a favorable crop. The same idea can be applied to growing forests or wood crop.

The Conservation Commission has completely solved the question for you of how you can establish a forest. It has developed tree nurseries where small trees are grown under ideal conditions and thus all of the dangers of infantile losses are overcome. It is prepared to supply you small trees that are robust enough to compete with other plant growth and they, like the corn, will soon overtop their competitors; be in control of the forces of Nature (light, soil and moisture), and soon result in these barren unprofitable areas being dominated by tree plant life and growing merchantable forests.

The Conservation Commission has millions of these small trees which will be supplied to the people of the State of New York for the purpose of reclaiming the millions of idle areas and thus lay the foundation for growing our necessary wood products.

Seed beds containing 12,232,000 one year old white pines, Saratoga Nursery.

How Trees Are Supplied.— The Conservation Commission, in order to assist land owners in reforesting, maintains nurseries at Saratoga, Lowville and Lake Clear Junction. Trees grown in these nurseries are sold to private owners at practically cost of production. These nurseries have a capacity for an annual production of fifteen million trees per year. Increase in production is anticipated.

There are some localities where wild stock can be collected but the cost of gathering is usually more than the prices we charge while they are less satisfactory because the wild trees have inferior root systems.

Applications for trees should be placed upon blanks furnished for this purpose. They may be filed at any time of the year. We, however, expect that orders will be placed sufficiently early to permit necessary attention. Trees are shipped either for fall or spring planting as the purchaser desires. They are sold under the following conditions:

1. Payment is required a short time in advance of shipment and after receipt of bill.

2. That the trees shall be used absolutely for reforesting purposes. We do not supply trees for ornamental purposes. Our purpose is aid in the extension of reforestation. An extra charge of $1 is made on orders of less than 5,000 trees.

Black locust, 1 year old, Saratoga Nursery.

3. The purchaser agrees to plant the trees and not resell them. Our purpose is to prevent speculation. The idea is simply to prevent some speculator purchasing our output and reselling them at a profit.

4. That the purchaser will make a report as to the success of the planting, if requested by the Commisison. This information is of value to people interested in reforesting. It is asked for only once during a period of several years.

5. That the trees will be planted in New York State. We can not supply trees for planting in other states. We are prepared to furnish various species of evergreen and deciduous trees such as white pine, red pine, Scotch pine, white spruce, Norway spruce,

Norway spruce, 2-year seedlings (1,833,000), Saratoga Nursery.

Scotch pine seedlings, 2 years old, Saratoga Nursery.

white cedar, black locust, white ash, Carolina poplar and other trees suitable for reforesting work.

The price varies from $2 per thousand trees for seedlings to $4 per thousand for the larger transplants.

Selection of Trees.— In order to have the plantation successful and prove a profitable investment there are four factors which must be considered. They are (1) what kind of soil have you to be planted, (2) what kind of product (lumber, pulp wood, posts, poles or ties) do you wish to grow, (3) should you use "transplants" or seedlings and (4) what kind of trees should be planted.

Soils.— The soil is a factor that can not be changed and its demands must be met. Some trees make more demands than others. The spruce require the best soil and the Scotch pine will grow on poor blow sand. An attempt has been made to classify in the following table the above mentioned trees according to their soil requirements. It is conceded that the better the quality of the soil the more productive will be the tree growth, but reforesting is not as a rule considered for agricultural land. The selection, therefore, becomes a question of what is the poorest quality of soil upon which trees may be planted and there make a profitable growth. The following table indicates generally the minimum soil requirements of trees:

250,000 white pine transplants, 3 years old, Saratoga Nursery.

Light sand	Coarse gravel	Sandy loam	Loam	Good soil	Wet lands
Scotch pine	Red pine	Red pine	White pine	White pine	Balsam
Car. poplar		Black-locust	Norway spruce	Norway spruce	White cedar
		Car. poplar	Car. poplar	White spruce	Car. poplar
		Europ. larch	White ash	White ash	
		White cedar	Europ. larch	Europ. larch	
			White cedar		

Product.— The owner must decide for himself whether he wants to grow hardwood or evergreen species; if he wants to grow poles, posts, lumber, pulpwood or other material. This being determined he should then consider the several kinds of trees which grow wood materials of merchantable kinds, and finally the tree or trees which grow at the most profitable rate upon his soil and under the conditions present.

There are many trees which are adapted for reforesting in this State and several of them even at the present prices of forest products offer profit in planting. These are the faster growing species which supply useful material. In the following table an attempt has been made to group the several species which are generally adapted for planting in this State and the purposes for which their wood may be used:

Posts	Poles	Ties	Pulp	Lumber
European larch	European larch	Red pine	Norway-spruce	White pine
Black locust	White cedar	White cedar	Balsam	Red pine
White cedar	Scotch pine	Scotch pine	Carolina poplar	Norway spruce
Scotch pine		European larch		European larch
				Carolina poplar

"Transplants" or "Seedlings."— All trees in order to make a profitable growth require light. Some kinds, such as spruce, have the ability to withstand shade, and to a degree it is beneficial to nearly all of them when they are small. In order to secure the most satisfactory growth a tree must have its light requirements

1,123,000 Scotch pine transplants, 3 years old, Saratoga Nursery.

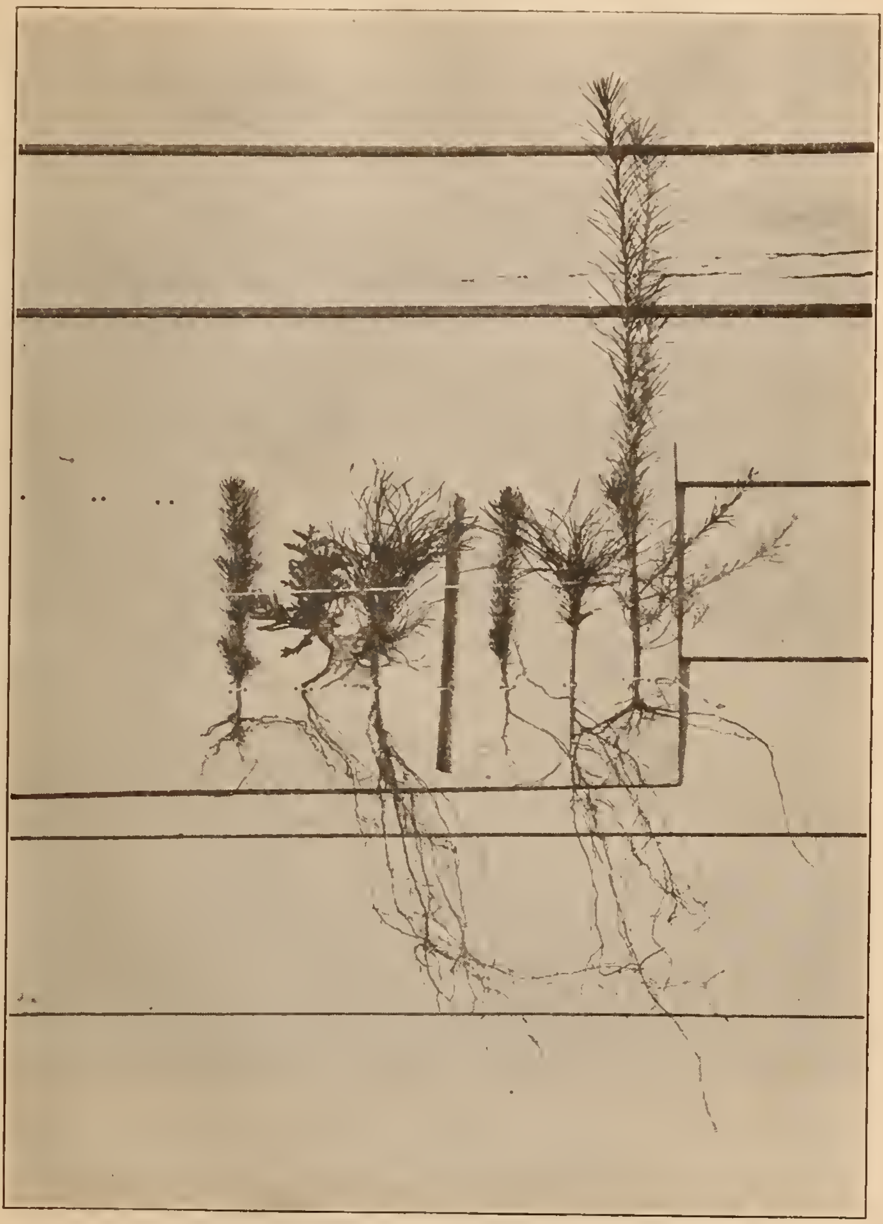
satisfied. The existing growth, be it grass, bramble, brush, mature trees, or other vegetation, and the density with which it stands (therefore, the amount of shade so produced, or, in other words, the scarcity of light which results for the planted tree) is a very important factor in determining not only what kind of a tree should be planted under these conditions but also the age or size of tree.

The size or age of trees you need will be chiefly determined by the nature and amount of vegetation growing upon the land to be planted. If you have fields that have only medium vegetation thereon the "seedlings" are strong enough to compete with the other growth there and succeed. The accompanying illustration gives an idea of the size of various seedlings compared to a lead pencil.

Norway spruce 3-year old transplants (1,500,000), Saratoga Nursery.

If you have lands covered with brush or growth of briars or bramble, then "transplants" should be used because they are older and stronger trees and for this reason can survive greater shade and competition.

The trees which are to be planted need only be strong enough to compete with the other vegetation. Large stock is unnecessary and often unsuccessful. Evergreen seedlings are two-year-old trees grown from seed in dense beds. They are from three to six inches in height, slim and have a small root system. Examinations of plantations and reports from planters indicate that evergreen seedlings do not do well upon dry sandy sites or upon heavy soils covered with a luxuriant growth of grass, weeds or other vegetation. Seedlings have succeeded well in old fields and pastures on moist loam soils where the natural growth of grass or weeds was



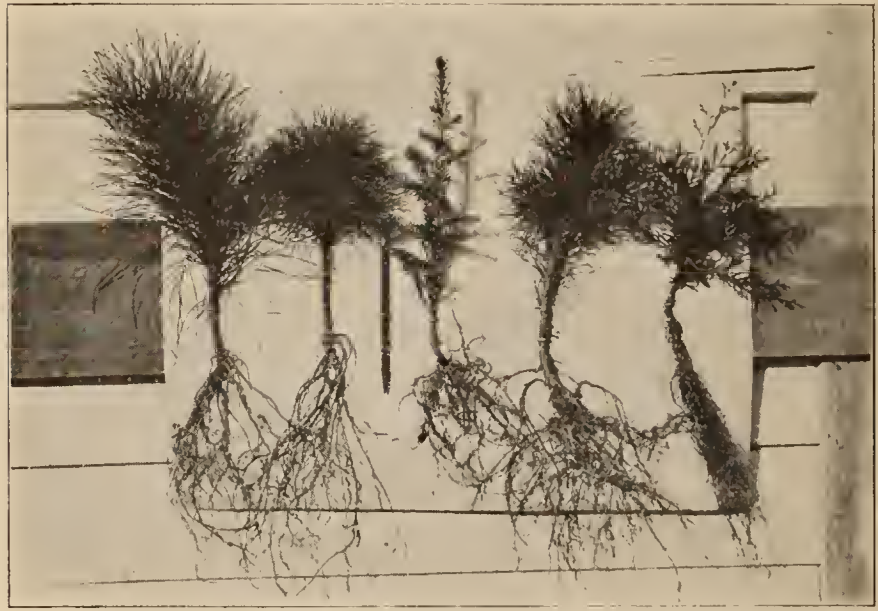
Two-year old seedlings. Left to right, Norway spruce, white cedar, Scotch pine, lead pencil (to show comparative size), white spruce, white pine, European larch.

not heavy. The three-year evergreen transplants are two-year seedlings which have been planted in rows in the nursery for one year. They are usually but little taller than two-year-old seedlings, but have a far better root system.

The hardwoods are generally sold as one-year-old seedlings and at prices ranging from $2 to $5 per thousand.

Cuttings, short pieces of branches, may be used to grow poplars. They are sold at $1 per thousand. We also offer Carolina poplar cuttings which have been rooted by holding in the nursery one year at $5 per thousand.

The purpose in using seedlings is to reduce the initial cost of making a plantation. There first cost is only one-half as much ($2 per thousand for seedlings as compared with $4 per thousand for transplants) ; the transportation is only one-half as much when sent by express; and the cost of planting is greatly reduced because a much smaller hole is necessary.



Three-year old transplants, Saratoga Nursery. Left to right, red pine, white pine, lead pencil (to show comparative size), Norway spruce, Scotch pine, white cedar.

A plantation made from seedlings will usually, after a few years, be as large as one made from transplants. The smaller the tree that can be used and succeed, the less shock there is to the little tree in moving it from the nursery to the planting field.

A light shade of grass and weeds help to protect the young plantation. The shade may slightly retard the growth but no money should be spent in moving brush or weeds. The plantation will outgrow this vegetation in a few years. If you want to ascertain the result of your planting, look the plantation over after the frost had killed the other vegetation.

(Left) Shipping crate containing transplants sufficient to reforest one acre. (Right) This pail contains 1,200 seedlings, 2 years old; enough to plant an acre.

Seedlings should not be used on exposed land where it is very dry; upon land that is too poor in quality to grow a sod; or under hardwood shade.

White Pine.— This species is usually found on sandy or light soils, but it will do well on any land that is well drained. It will thrive in good soil as well as any other tree when once established. The better the soil, the faster its growth will be. This has been one of our most valuable timber trees and adapted to a wide range of soils. It should not be used on the light, sterile sandy soil which will not retain a vegetable covering, or in places where the soil is saturated with water or subject to serious flowing for a long period. It can be used on light soils that have the ability to maintain fibrous coverings. It is subject to attacks of the white pine blister rust and white pine weevil. The presence of these pests in any locality should be investigated before planting white pine.

Removing trees from crate as shipped from nursery and heeling them in.

Scotch Pine.— On the poorest sterile soils the Scotch pine is far more desirable for use than is the white pine. It is particularly adapted for this purpose because it has a long tap root which goes deep into the soil and is not affected by drying out of the surface soil. The lumber produced from this tree is not as valuable as that of white pine, but the greater growth that it is able to make on the very poorest sterile soils ought to offset the difference in price under his condition.

Red Pine.— The red, or Norway pine, is a native tree in this State. It is very desirable for use on coarse, gravelly soils. The lumber is not generally as valuable as white pine, the wood being harder, but it is better than that from Scotch pine. This species is comparatively free from plant diseases and insect pests, which is one of the strongest points in its favor, especially for planting in localities where white pine weevil and blister rust are very destructive. The seed is scarce and, therefore, it can be grown in only limited quantities.

Norway Spruce.— This tree has been introduced from Europe and generally planted in the northeastern states with good results. It is perfectly hardy in this State and has been used for forestry purposes here in preference to our native or Adirondack spruce. It is the one generally used abroad, and is used in practically all cases in this State wherever spruce is planted. The spruces have a flat root system and are, therefore, adapted to use on shallow soils if other requirements are satisfied. It is the best conifer we have for use on swampy or wet locations. In order to make a desirable growth it should not be planted on sand or light soils. In the latter part of this pamphlet will be found some figures as to the growth of this species and its value as a crop. It is desirable for underplanting and use under heavy shade.

Covering the roots of "Heeled in" trees. Here are trees enough to plant one acre.

White Spruce.—White spruce is a native tree in some sections of the Adirondacks and is widely distributed in Canada. It is suitable for the production of paper pulp and grows well under conditions similar to those required for Norway spruce. It is highly recommended.

Balsam.— Should be used only in exceptional cases. Norway and white spruce are far better trees for situations where balsam would ordinarily be used. We are growing this tree for Christmas tree purposes and for planting on low ground.

European Larch.— This is a true mountain tree of Central Europe, and when planted in this country has usually made a fine growth. The wood is very durable and strong. It is not like our native larch (the tmarack) a tree of the swamps, yet it requires a deep, fairly porous, and moderately fresh soil. It should not be used on the poor sandy soils. The season's growth often begins before the frost is out of the ground and, therefore, it should not be used where the danger from late spring frosts is great. It is a

Making hole with a mattock for planting a tree.

rapid grower, but demans a large amount of light. It is best used in mixture with spruce, pine, or some of our hardwoods. It can be set in pure plantations if it is desired to underplant when the trees are about twenty-five (25) years old. It makes excellent ties, posts and poles. Fence post size should be attained in fifteen years. It is best to plant the tree during the fall rather than spring.

White Cedar.— This is a rapid growing tree. It is valuable for posts, poles and ties. It grows on nearly any kind of soil. The European larch and white cedar are our best fence post materials for planting.

Hardwoods

In some cases and for special purposes the owner may desire to grow hardwood rather than coniferous trees. In order to assist such parties, we are growing white ash, Carolina poplar and black locust.

White Ash.— Is a desirable tree for planting in this State outside of the Adirondacks on moist soils of fairly good quality. The trees, the first few years, will withstand heavy shade, but when established should have full light. It is a rapid grower and the wood is of great value.

Black Locust.— This tree is suitable for planting on any soil except undrained swamps. It is sensitive to frost, hence not adapted for planting in the Adirondack or Catskill regions. It requires a large amount of light and should not be used for underplanting or where there is much shade. It is liable to injury from wood borers in most localities and less loss to the plantation is sustained where locust is planted alternately with pine, spruce, European larch or other species, as soil requirements permit. In some cases black locust has been planted 12 x 12 feet, so that there would be little shade, grass would come in, and the ground could be used for pasture. Under such conditions the trees do not make such good growth.

Black locust makes one of the most durable fence posts, in which form it finds its greatest value. Size suitable for fence posts should be attained in twelve to fifteen years after planting if not injured by the borer.

Catalpa.— The catalpa has been extensively recommended and advertised as a tree for forest planting. Its use in this State is limited and cannot be recommended for forestry purposes because it requires good agricultural land and much care after planting. In the purchase of this stock care should be taken to secure the *hardy catalpa* (Catalpa speciosa). It is sensitive to early frosts and should be planted only in the warmer portions of the State. There are many other trees better adapted to our uses. The claims made by nurserymen should not be accepted without careful investigation. We do not grow this tree on account of its limited use.

Black Walnut.— This tree has been planted in some localities on a large scale. The high price of lumber from this tree has been due to the very dark color of the heart wood which is secured only from old trees. It is a fast growing tree with but little soil requirements except a reasonable amount of moisture. It can be successfully grown throughout the State except in the mountain sections, but undoubtedly other trees can be planted to produce a merchantable crop in less time and with a larger profit on the investment.

Planting a transplant. Holding the tree at the same depth at which it grew.

Carolina Poplar.— Plantations can be started by using cuttings which have been rooted for one year in the nursery. If the land owner has a small garden patch where the cuttings can be set in nursery rows one foot a part and space two or three inches apart in the row, it would probably be advisable to buy the cuttings and root them for one year in this way. The tree is a rapid grower and should attain sizes suitable for pulpwood, excelsior and box boards in approximately fifteen years. The pulp and paper companies have found this wood satisfactory for their use when treated by soda process, and it is especially suited for use in making excelsior.

When to Plant.—Trees should be planted when the growth is dormant and work can be done. Such seasons are during the spring after the frost is "out of the ground" and before the season's growth begins, also during the autumn after growth has ceased, and sufficiently long before the ground freezes to permit the soil to become firm. The exact time will vary with season and parts of the State, but will be approximately April 10–May 10 and September 1–October 15. The advantage of season is difficult to forecast. The weather following planting will largely govern the success of the planting, other factors being equal. Dry soil or drought is very injurious. Dry summers are as likely to follow as is a dry fall. Spring seasons usually have more rainy weather, and thus greater loss of time. Fall planting offers other inducements. Labor is more plentiful, work less pressing and men can be boarded for less cost. Spring planting has been more popular, but fall planting has on the average been very successful provided there is a covering of snow during the winter. Fall planting on areas that are likely to be blown clear of snow suffer most.

Plantation made with transplants as it appears at the end of the first season.

How to Plant.— The small seedlings or transplants, no matter which kind are used, should be planted about two paces (about six feet) apart in both directions. This means that the trees are to be about six feet apart in all directions and if there is no waste space, about 1,200 trees are required to plant an acre.

There is nothing difficult about "setting" the trees out, but a few precautions should be observed.

First.— If you purchase trees from the Conservation Commission, a notice will be sent you from the nursery about three days before they are shipped. This notice will advise you the exact date and place that they are to be shipped from. You should then get in touch with the express office at which you have requested the shipment to be made, and obtain the trees as soon as possible after arrival. The trees should not be left in the package any longer than necessary because they may heat and thereby become injured.

White cedar planted in 1921, 3-year old stock, DuMond Farm, Delaware County.

Second.— When the trees are received, take them at once to the field where they are to be planted and there "Heel in." This means digging a trench with an ordinary round pointed shovel — the width of the shovel blade — about six inches deep and as long as is necessary to hold the trees which you have.

Third.— Cut the wire holding the cover on the crate. Unpack the trees at once by taking bunch after bunch out and placing them upright in the trench (beginning at one end of the trench) and filling the trench solid with bundles and packing the bundles tight in the trench until all of the trees have been "heeled in." If you select a shady and moist place for "heeling in," it is very desirable. After all the trees have been "heeled in" pack dirt firmly around the roots of the last bundles placed in the trench. This is necessary in order to assist the roots in retaining moisture. The trees may be kept in the bundles for several days. If the weather is dry, a good soaking with water is desirable.

White pine plantation nine years old, DuMond Farm, Delaware County.

Fourth.— These trees are sold at a very low price and with the understanding that the crate is to be returned to the nursery from which it was shipped. Will you, therefore, use the crate as carefully as possible and return it to the express office, that it may be reshipped to the nursery? These empty crates are carried by express at a very low price. If not so returned the crates must be paid for.

Fifth.— Trees may be removed from the trench as needed for planting but whenever bundles of trees are taken, you should be sure to recover with several inches of moist soil the end of the row of trees remaining in the trench.

Sixth.— When you are ready to plant, remove a few bundles from the trench. Cut the bands around the bunches and place the trees roots down in a pail containing some water. Always know that the roots of the trees are kept wet.

Seventh.— It is always best to plant the trees in rows because through this means you will get more uniform spacing and consequently a fuller utilization of light, soil and moisture.

Eighth.— The planting can be done by two men working together or by several pairs of men. The first pair of planters should start on a fairly straight line. The leader should have a single bit mattuck or grub hoe. He will commence by digging a hole about the size of an ordinary tin tomato can. He should leave the dirt in a convenient pile at the edge of the hole so it can be quickly available for the man who follows who is to do the planting. After this hole has been dug, he should look ahead along his real or imaginary line, take about two good paces and dig another hole and proceed this way across the field to be planted. The second man of the pair should have the pail with the trees and should follow closely behind the man who is taking the lead. As he approaches the hole where the tree is to be planted, he should remove from the pail a single tree. There is on each tree, a scar which indicates the depth at which the tree grew in the nursery. It is important that the tree be replanted at the same depth. This can be done best by the planter putting his thumb and forefinger exactly on the scar and then putting the tree in the hole and raising it up until the thumb is on a level with the surface of the ground. The dirt which had been removed should then be replaced around the roots of the tree and when all of the soil is put back, the planter should step on each side of the tree with his whole weight to pack the soil down, trying to restore the soil to the same condition as it was before the hole was dug, in order to effect natural soil and moisture conditions.

The planter then steps forward to the second hole, repeats the process and continues on.

If you have more than two crews for planting the various crews proceed in the same way, the second crew about one space behind the first crew, etc.

There are cases where seedlings are used that the planting can be done by making a wedge-shaped slit in the soil, then insert the tree and then tightly close the hole, pinching the dirt around the tree. This is a great saving in labor. It is not a desirable method to follow when transplants are used. It should not be used on land that has "duffy" soil or is very rooty. It is practical only in light sod or mineral soil and when seedlings are used. *Extreme care should be taken to be certain that roots are placed straight down and not doubled up. Replanting the tree the same depth as before is of great importance, particularly in using spruce.*

It is absolutely necessary that a much larger number of trees be planted on an acre than would be found in a mature forest. A close, dense stand of trees is necessary while they are young in order to produce a proper development in the future growth. The close planting produces a crowded and shaded condition which kills off the side branches when the trees are small, reduces the number and size of the knots and finally makes a higher grade of lumber. The dense stand also causes the trees to grow much taller, and hence there will be more logs in a tree. The value of this close planting is easily seen when we compare the difference in trees which have naturally grown in a forest with those in the open.

Scotch pine plantation made in 1915, DuMond Farm, Delaware County.

There are, however, other considerations than growing the highest possible grade of wood material. We all realize that some soils will produce much larger quantities of farm crops than others. As a general rule the land that is most likely to be used for tree planting will be the poor, meager soils of a small productive capacity. Hence, in order to make the growing of wood crops profitable, consideration must be given to the quality and productive capacity of the soil where the planting is to be done. If twelve hundred trees per acre are growing we would naturally expect to produce a tree having a diameter of twelve inches in less time than we would if there were seventeen hundred trees per acre. Therefore, in order to make planting profitable, we must not only grow good timber in a dense stand, but at the same time aim at a profitable harvest in the shortest possible period.

In some cases there will be a tree growth upon the land desired to be planted. If the present growth is such that it can be utilized to sufficiently crowd the young trees and cause them to make a good height growth and produce sufficient shade to kill off the side branches, the trees can be planted in openings of from twelve to fifteen feet and more, or wherever they will have necessary light. This method is called underplanting.

Care of Plantations.— Naturally every investment is attended with some risk, but in case of forest properties the owner must care for his own property, and to a very large extent his own policy determines its safety. In reforesting there are but four risks to be considered. They are injury from domestic animals, forest fires, insect pests and plant diseases.

Cattle.— There is but little use in attempting reforesting unless the plantation is to be protected. In any case all domestic animals must be excluded after planting. They not only stamp down and injure the small trees but often eat them off, producing stunted or deformed trees.

Fire.— This is the worst enemy of young trees. A plantation, or in fact any forest growth, should always be protected from this danger.

Insect Pests.— They are of but little consequence in connection with the trees considered in this publication except the black locust and white pine. The locust is attacked by borers in some parts of this State and is, therefore, only a short-lived tree. The white pine weevil destroys the terminal shoots of young white pine trees. In case of any insect troubles correspond with the State Entomologist, Albany, N. Y.

Plant Diseases.— These, except the white pine blister rust, fortunately are not sufficiently common in this country to be seriously considered. The importation of trees for reforesting purposes is now prohibited by quarantine.

The white pine blister rust is serious but can be absolutely controlled by the careful destruction of all currant and gooseberry bushes on the area to be planted and on a strip about nine hundred feet in width surrounding it.

Cost of Planting.— The cost of planting varies with local conditions, such as soil cover, topography, nature of the soil, size of the trees, price of labor, transportation, etc. An examination of several hundred reports made to this office shows that the price ranges from $3 per acre for underplanting, when 400 transplants are set, to a maximum of $15 to $16 for setting transplants at the rate of 1,200 per acre. The latter price is not a fair criterion of the cost because in this case excessive cartage, unnecessary preparation of the ground, etc., produce this price. Generally, the average price, including cost of trees in cases where transplants are set six feet apart each way, is approximately $12 per acre. The cost of seedlings and labor in planting will average about $9 per acre.

Yield From Planted Forests.—There is not at hand sufficient data upon which to predicate reliable figures as to the quantity of material that will be obtained from planted forests because there are only a limited number of plantations which have attained such an age and size as to make them merchantable. The few plantations that there are, are situated in New England but their growth ought to be comparable to results that would be obtained under our conditions.

Thirty acres of 10-year old white pine, DuMond Farm, Delaware County.

There has been some study made in natural stands where the density and composition of the forests approximate plantations. As a general rule, it is fair to assume that the growth in planted forests should be equal to or greater than that of a natural stand because in plantations there is a more uniform spacing of trees and, consequently, a better utilization of light, soil and moisture.

The following information is submitted simply as data which has been procured, together with the source of the information.

The following yield table for white pine was constructed after examining and measuring 177 sample plots of natural growth in Massachusetts of various ages scattered throughout the State.

YIELD TABLE FOR WHITE PINE.*

AGE (YEARS)	Soil quality I 1 inch boards	Soil quality II 1 inch boards	Soil quality III 1 inch boards
	Ft. B. M.	*Ft. B. M.*	*Ft. B. M.*
25	10,825	6,750	3,975
30	19,900	12,500	7,500
35	31.150	24,400	16,950
40	40,650	32,800	25,200
45	49,350	40,600	32,100
50	55,150	46,500	37,550
55	59,650	50,550	42,100
60	63,600	53,200	44,550
65	67,050	56,600	46,150

This table indicates at a glance that much more timber can be grown in the same period of time on good soil than on poor soil. The highest production was found on the rich lowlands, where the soil was deep, rich and moist, but withal well drained. The upland pasture, our hillsides and upland plateaus, which form the largest part of land where wood crops will be planted, is indicated by soil quality II. The rate of growth here is not far below that of soil quality I, because the pine finds its demands as regards moisture, food supply, etc., well supplied. The third quality of soil consists of the wet, cold, mucky swamps, or the most sterile drifting sands. For the purpose of this publication soil of the second quality will be considered, because this is the kind of soil that will most largely be used for growing forest, raising crops of timber and wood materials.

The table shows in a most striking manner how the quantity of timber increases with the age of the forest. It, therefore, shows what a short-sighted policy and poor financial plan it is to cut growing forests. It will be seen that a forest thirty years old contains nearly twice as much lumber as one twenty-five years of age, or a thirty-five-year-old crop three and one-half times as great as when harvested at twenty-five years; also, that while it takes twenty-five years to grow the first 6,750 feet of lumber, nearly 40,000 feet more can be grown in a second twenty-five years—*i. e.*, allowing the crop to grow fifty years.

The following information was submitted by J. R. Simmons, Forester, New York State Forestry Association.

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* The above table from publication "White Pine in Massachusetts."

The Latham plantation, comprising 12 acres, at East Bridgewater, Mass., was cut clean between 1921 and 1923 when it was 48 years old. It was set out at a spacing of 8′ x 10′. Wild white pine stock was used. No thinnings have been made. The yield was 49 cords of box board logs per acre.

The C. M. Cook plantation, at Bridgewater, at 50 years of age, contained 35,000 board feet white pine per acre. Similar plantations at Taunton and Hanson each scaled about the same. The Rehoboth plantation of white pine, containing 7 acres when 56 years old contained 44,000 feet. The Sharon plantation, consisting of 2 acres of white pine, when 56 years old contained 38,500 feet of white pine per acre. The Georgetown plantation of 2½ acres, when 48 years old, contained 33,000 board feet of Norway spruce and white pine per acre. The Kilbourne plantation of white pine at South Lancaster, Mass., was thinned in 1908 when it was 60 years old. The suppressed and inferior trees were removed and a record kept as to 2 acres which yielded 14,000 feet box boards and 40 cords of wood and there remained 45,000 board feet of white pine per acre.

Interior Norway spruce plantation twenty-four years old, Millbrook, Dutchess County.

There will be a difference in the value of plantations, due to the method of utilization. In the case of Norway spruce and other trees which will be utilized for round wood purposes, such as pulpwood, the material will be figured by the cord and there will be no waste, nor is it necessary to make any allowance for slabs as in the case of the manufacture of larger trees for lumber. In some localities, trees, like white pine, may be sawn "round edge" and used as box boards or in some cases can be sold as round wood for match stock, staves, etc. The conditions of local markets will have a very decided effect upon the method of utilization and the quantity of the product that is merchantable.

It should be borne in mind that the above tables from Massachusetts show the actual product obtained at the mill of lumber sawn.

The following are some figures relative to the growth of Carolina poplar where measurements were taken on a plantation in Minnesota:

Age years	D. B. H. inches	Height feet
5	3.3	12
10	6.7	23
15	9.9	33
20	12.9	43
25	15.7	52
30	18.4	61
35	21.0	69
40	23.4	77
45	25.4	84
50	27.1	91

DIVISION OF SARATOGA SPRINGS

DIVISION OF SARATOGA SPRINGS

J. G. Jones	*Superintendent*
C. B. Elmore	*Secretary*
Herbert Ant	*Chemist*

DIVISION OF SARATOGA SPRINGS

During the year ended June 30, 1924, the State Reservation at Saratoga Springs made greater strides towards its objective of properly serving the people of the State of New York, than during any previous year in its history. Accommodations and equipment for the giving of treatments at the State bath houses were largely increased, and greatly improved, through the erection of the new wing of the Lincoln Bath House, the new laundry building and store house, the new high pressure mineral water pipe line to the Saratoga Bath House and the increasing of low pressure mineral water storage by 150 per cent. A detailed description of these improvements is given elsewhere in this report.

Overcrowding Relieved.— The effect may be summarized as follows: The evil of overcrowding in the bath houses, which has been present for the past five or six years, was entirely eliminated by the opening of the large number of new bath rooms in the Lincoln Baths addition. That there have always been patrons who desired to use the Lincoln Baths because of its lower price, but who could not do so because of its overcrowded condition, is shown by an analysis of the number of treatments given at the three bath houses for the seasons of 1923 and 1924:

	1923	1924
Treatments at Lincoln Bath House	38,133	53,471
Treatments at Washington Bath House	15,959	13,831
Treatments at Saratoga Bath House	30,432	26,000 (estimated)
	84,524	93,302

Lincoln Bath Patronage Greatly Increased.— From the above table it will be noted that the number of treatments at the Washington Baths decreased by about 2,000 in 1924, that at the Saratoga Baths by about 4,000, while the number at the Lincoln Baths, including the new wing, increased by 15,000, or more than 40 per cent over the season of 1923. This increase at the Lincoln Baths and corresponding decrease at the other two higher priced bath houses, shows itself very distinctly in a comparison of the receipts for the two seasons. Whereas the number of treatments show an increase of a little over 10 per cent, the receipts from the baths show an increase of only about 7 per cent. This is due to the large number of patrons who formerly patronized the Saratoga and Washington Baths at a higher price, but who now turned their patronage to the Lincoln Bath House at the minimum price. In considering the above comparisons the fact that the bath houses were open half days on Sundays during the 1923 season and were open only six days a week during 1924 must be taken into consideration. The Sunday morning period was always one of intense overcrowding and rushing, making it impossible to obtain proper

Front view of the Lincoln Bath House, part of Washington Bath House shown on the right.

therapeutic results from the treatments. It did not allow to each employee his rightful one day's rest in seven, for the attendants were never able to leave the bath house before 1 P. M. on Sunday; and it provided no spare time for necessary mechanical repairs, which had, therefore, to be undertaken during the night, at a considerable extra expense. The actual cost of operating the bath houses, boiler plants and pumping plants for the half day on Sunday had been found to be so high as to leave a very small margin of receipts over costs on this half day.

Receipts.— The total receipts from all activities of the Division of Saratoga Springs for the fiscal year 1923–24, as shown on the financial statement at the close of this report, was $138,601.28. During the same period, the actual cost value of structures and equipment as carried on our books was increased from $431,879.29 and $133,995.52 to $574,370.43 and $164,127.52, respectively.

Lincoln Bath Improvements.— The Lincoln Bath House during the past year has been enlarged by the addition of a new section equal in size to the original building and connected to it by a large lobby and waiting room. This new section of the Lincoln Bath House is of frame construction on a concrete foundation with pipe galleries running underneath the entire length of the building for convenience and economy in the installation and repair of all service lines. The building is two stories high and is furnished with 82 bath rooms, four large rest rooms, and a suitable number of dressing booths. The bath tubs and heaters are of the type which we have made standard and are installed with the requisite piping, valves and other apparatus which our past experience has shown us to be necessary for this class of work. The interior of the building is finished throughout with sheetrock wall board and is painted white in accordance with our usual practice. Floors of the downstairs wings are all of concrete while those in the second story are concrete in the bath rooms and natural wood in the dressing room and rest room sections. A small western wing of the new bath house contains on the first floor two hydrotherapy rooms which are each equipped with massage tables, electric light cabinets, shampoo table, shower and douche stall and control table complete for the giving of all our special treatments in this bath house. Due to lack of space in the old building, special treatments have not heretofore been given at the Lincoln Bath House for a number of years. The rest rooms in this new section are airy and well lighted, and the rest rooms in the old part of the building were increased in size and improved by the addition at each end of the building of semi-octagonal structures. The new building was put in use on July 1st, and during July and August three of the four sections of the new wing were in constant use and remained open until September 15th.

Important Additions to Plant.— The second structure added to this group of buildings during the past year was a combined laundry, machine shop and store house, 180 feet long and 40 feet wide. The laundry, located in the north end of this building, has been increased in capacity by the addition of four new brass-trimmed washers, a 48-inch self-balancing extractor and a large low temperature dry room tumbler. It was found possible to use a smaller dry room tumbler, two 30-inch extractors and a 100-inch five-roll ironer, which were formerly installed in our old laundry in the basement of the Patterson building in Saratoga Springs.

All hot water for laundry use is supplied by a circulating pump from the boiler feed water heater in the boiler plant nearby and all piping and electric conduits are brought to this building, as well as to the Lincoln Bath House, through the new concrete pipe gallery, which will be described later. With this equipment we were able to turn out more than 1,200 pieces of flat work per hour, our output reaching the astonishing total of 407,410 pieces during the months of July and August. Due to proper design and installation of equipment and to the ideal working conditions provided, this amount of work was handled with a very small working force.

The laundry, Lincoln Bath House, Saratoga Reservation.

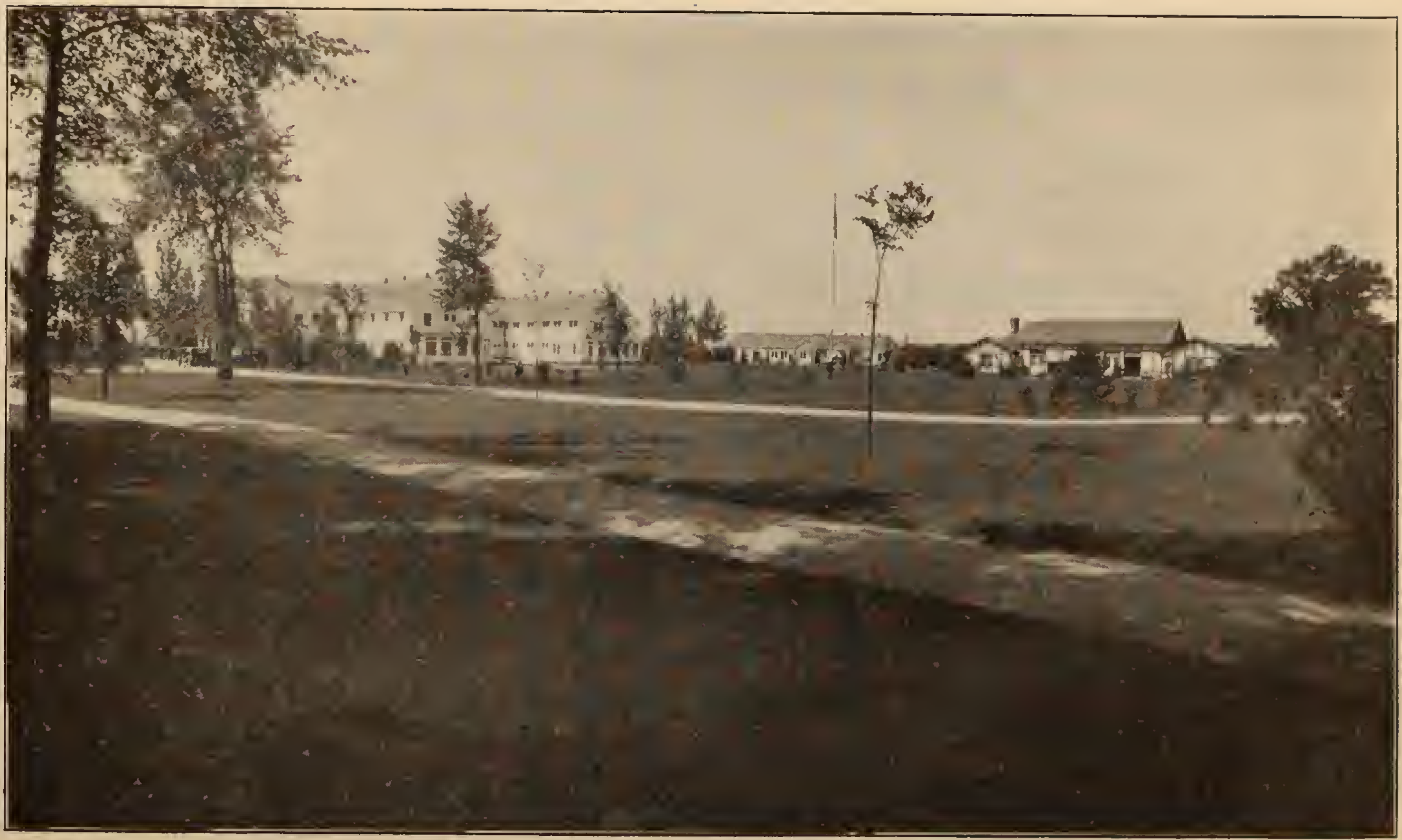
Directly back of the laundry, in this building, is located a machine shop and work room where all pipe cutting and threading and similar work is carried on. Next to the machine shop is a room which will be used as an auxiliary garage, repair shop and painting shop for automobiles. The remainder of the south end of the building is arranged for the storage of pipe, cement, lumber, spare pumps and all other material of which a stock must be carried for use about the reservation.

Connecting the power house and boiler plant with the Lincoln Bath House and with the new laundry is an underground concrete pipe gallery which has been constructed in connection with the erection of the new laundry and bath house buildings. This gallery is five feet wide and six feet high inside, is electrically lighted, and is provided with openings to the surface of the ground at proper intervals, not only for ventilation, but also for easy access in case of an emergency. Through this pipe gallery are carried steam mains, fresh water mains, mineral water pipe lines and electric conduit lines for the supplying of these buildings. Due to the peculiar characteristics of the mineral waters of Saratoga Springs and also due to the constant demand for increased facilities at the bath houses, it has been necessary each year for sometime past to take up and renew or enlarge various pipe lines, steam mains and electric lines. This pipe gallery obviates the necessity of any excavation in connection with these repairs or enlargements and will undoubtedly pay for itself many times over within the next four or five years.

The increased capacity of the Lincoln Bath House made necessary the installation of a large amount of equipment about our power house and pumping plant. Three 8-feet by 40-feet steel mineral water storage tanks were installed in addition to the two previously in use, giving us a total mineral water storage capacity of 80,000 gallons. A larger power-driven deep well pump was installed in the No. 7 well in the cellar of the Washington Bath House and an additional well, the No. 4 on the Natural Carbonic Tract, was put in service for supplying mineral water for the baths. It was also found necessary to install new sewer lines connecting our sewage pump at the power house to the city sewers at the corner of South Broadway and Lincoln Avenue.

Improvements to the Grounds.— Very attractive electric signs were placed and proper wiring installed in front of both the Lincoln and Washington Bath Houses. A 50-foot flag pole was erected on the lawn between the two bath houses. All drives and walks about these buildings were coated with fine crushed stone and the work of maintaining our old lawns and leveling and seeding new ones in this district has been constantly carried on. A large electric switchboard with all necessary equipment was installed in the power house to control light and power circuits to all buildings and equipment. An old 4-inch wooden pipe line which formerly conveyed mineral water from the Lincoln tract to the Saratoga Bath House and which has been a constant source of trouble and expense for a number of years past, was replaced in the spring of 1924 with a new line of 4-inch Universal cast iron pipe. The location of this line was changed to a more direct route and through this installation we have been enabled to largely increase the supply of water to the Saratoga Bath House by carrying a higher pressure in the new cast iron pipe than was possible in the old wooden pipe.

In addition to the large amount of filling, leveling and grading which has been done about the new Lincoln and laundry buildings, a considerable number of improvements have been made in other parts of our park system. A new spring pavilion of our standard type was erected at the Old Red Spring in the north end of the city of Saratoga Springs, where the use of this mineral water has increased enormously in the past four or five years. At the same



The enlarged Lincoln Bath House, Saratoga Springs. Laundry in background, power house on the right.

time proper drainage facilities were provided and filling and grading work was carried on to make this spot very convenient and attractive. In the High Rock Park a flight of concrete steps was erected up the face of the rock ledge marking the Saratoga fault in this park. These steps replaced a very difficult and rather dangerous path which was the only former means of reaching the Park from the Maple Avenue side.

In Congress Park near the Congress Spring Sunken Garden, the old Columbian Pavilion was demolished and its site filled and graded. Electric lighting was provided at the Hayes, Hathorn No. 3 and Cœsa springs because of the large popular use of these springs during the evening. Extra toilet facilities were provided for at the Hathorn No. 3 Spring and the sewage disposal equipment there was greatly improved. The same was done at the gas plant and the Geyser bottling works where septic tanks for proper sewage disposal have been installed.

Traffic Congestion Relieved.—At Hathorn No. 3 Spring where the traffic congestion, due to many tourists stopping to drink the water, has caused a dangerous condition, the width of the road was increased by ten to twelve feet with the cooperation of the New York State Highway department. This work was completed in the spring of 1924 and proved a great boon to those who make use of these very popular springs. In the Vale of Springs, the old wooden rustic bridge, steps, and railings, which were a constant source of expense, were replaced with a wide stone culvert, and by concrete steps from the Cœsa Creek up to the level of the Orenda Spring.

The Avenue of Pines.—The Avenue of Pines was resurfaced throughout with gravel from our own bank, as were the roads about the gas plant, the road leading from the lower bridge to the Meadow Gate and that leading from the gas plant to Hathorn No. 3 Spring. As in past years constant work has been done along the lines of widening and straightening our roads and making them safer and more accessible for tourists and sight-seers. The trees along Ballston Avenue have all been trimmed to a height of about twenty feet from the ground as have those on Columbia Avenue and in the north end of Geyser Park. The pine trees along the Avenue of Pines were trimmed up to a height of about eighteen inches, removing the lower branches which had become dry and unsightly because of the growth of the upper part of the tree.

Additional Land Required.— By means of appropriation of the Legislature of 1923, it was possible to take over the Chief mineral spring property of seventy-two acres as well as the smaller Clark, Carragan, Pettee, and Cole properties in the Geyser Park district. A similar appropriation by the 1924 Legislature will enable us to take the Fellows, Just, Harrison, Stiles and Turner in the Geyser Park district, and the Drake, Buckett, Sherman, and Webber properties on South Broadway. It is also planned to take a tract of fifteen acres directly west of the Smith property on which is located the State Nursery.

Thousands daily take the water of Hathorn Spring No. 3, State Reservation, Saratoga Springs.

More Park Accommodations Needed.— The increasing use of our parks, picnic grounds and camping places makes it absolutely essential that better and more abundant accommodations be provided at these points if the public demand is to be met. A considerable sum of money is needed for the enlargement of camping and picnic grounds; providing of water supply and increased toilet facilities at these points; building additional shelters and pavilions not only at the camping ground but also near several of the more popular springs; construction of a dam and bathing pool at the Geyser Park picnic ground, and a great deal of general work which is needed on the roads and paths and bridges of Geyser Park. A small amount of this work has been carried on during each of the past several years, but the size of the appropriations available for park work has made it impossible to carry out this work in that extensive degree which has now become absolutely necessary if the State Reservation Parks are to properly serve the visiting public.

Spouter in the Vale of Springs, Saratoga Reservation. Champion No. 3.

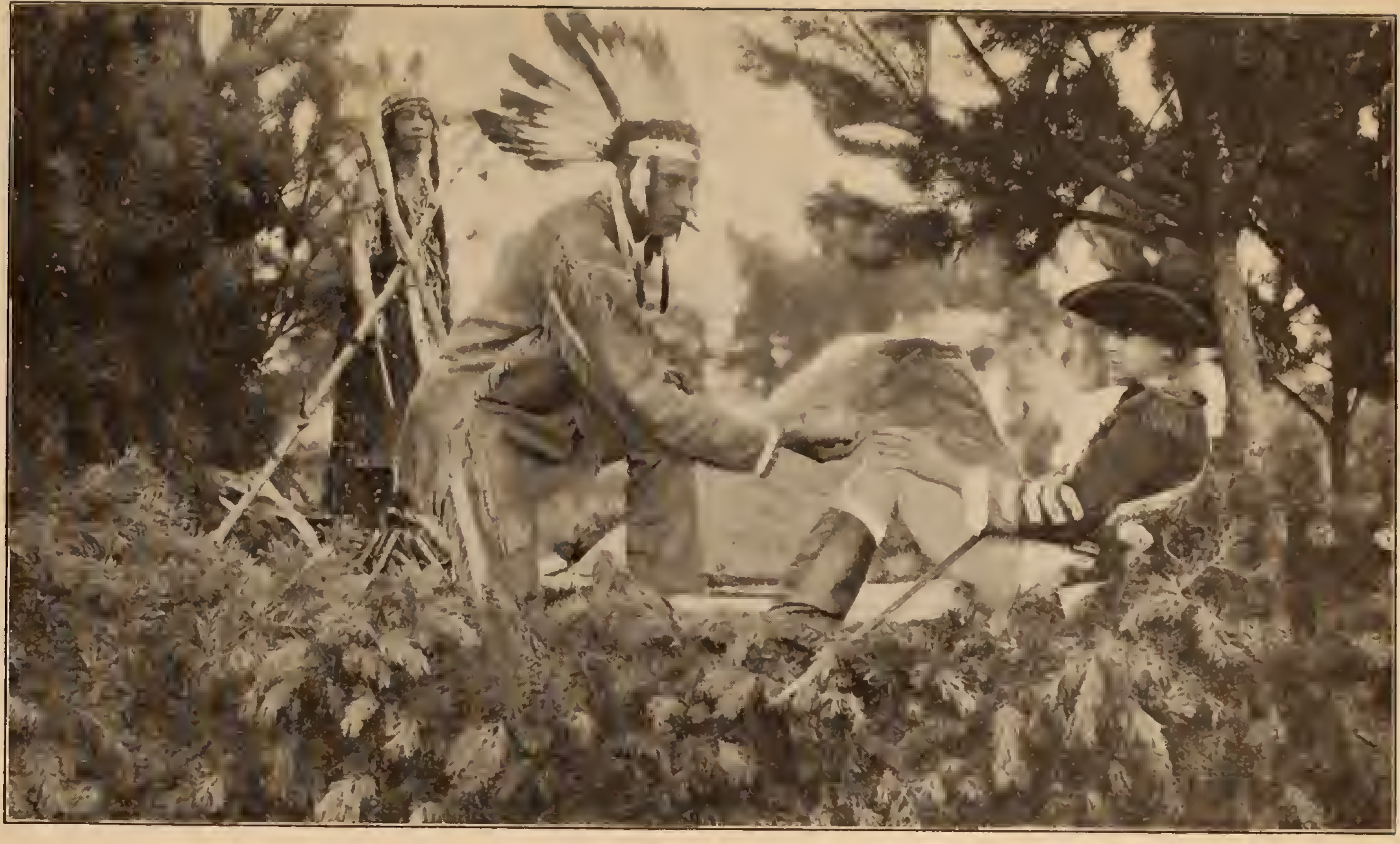
At the Drink Hall in Saratoga Springs, which is operated by the Saratoga State Waters Corporation, the sanitary facilities were largely increased and the exterior of the building was repainted.

New Equipment.— During the year a considerable amount of equipment has been added for the use of the construction and repair department. This equipment included a saw table and planer, which proved invaluable during the erection of the new buildings, and a low pressure spraying equipment complete, which has enabled us to speed up our painting work enormously. We have also purchased and had in operation during the season of 1924, a third automobile bus, with a carrying capacity of 35 passengers, used for transporting patrons to and from the Lincoln and Washington Bath Houses. Two buses were already in operation, with a capacity of twelve and twenty-five, respectively.

Better Water Supply.—Work which is immediately contemplated, includes the driving of 8-inch outside casing on two of the wells on the Lincoln Tract, which now have 6-inch casings. During the past two years it has been impossible to secure sufficient pressure of city water at the Lincoln and Washington Bath Houses for our operating needs, to say nothing of proper fire protection, and a booster pump was in constant use to keep the pressure at a proper point for our needs. We have, therefore, begun the installation of a 6-inch cast-iron water main northwest from the power house in the Lincoln Tract to intersect the city main in Ballston Avenue. We believe that this, in addition to our present 4-inch main from South Broadway, should supply our needs for some time to come. Two of the water tube boilers in our boiler plant at the Lincoln, which are more than twenty years old, will be entirely retubed during the winter, as their condition has been found to be unsafe for further use. It is planned to do a considerable amount of work in the offices of the Division, in the Hathorn Spring Building, to render them more convenient and attractive to visitors, as well as provide more room for our constantly increasing files of clerical and technical records.

All of the work which has been done during the past year and which it is planned to do in the near future has been and will be carried on entirely with our own force. We have found it to be more efficient, more economical and more satisfactory to take care of our own construction and repair work in the manner we have found necessary than it would be to contract for it. In fact with our enormous plants and large amount of equipment it would be absolutely impossible to carry on the operation at Saratoga Springs without a sufficient force of mechanics of various kinds in our own immediate employ.

Historical Tableau of The Springs.—A very interesting incident of the 1924 season was this division's participation in the Saratoga Springs Floral Fete and Parade. The State Reservation was represented by a float arranged on one of its large trucks to represent the first use of the medicinal Saratoga waters by a white man. History records that in 1767 Sir William Johnson, Superin-



Historic float showing Sir William Johnson, the first white man to take the Saratoga cure. The Indians are lineal descendants of those who accompanied Sir William Johnson.

tendent of Indian Affairs, was borne on a litter by friendly Mohawk Indians through the woods from the village of Schenectady in order that he might bathe in and drink the healing waters and be cured of his gout. The truck was entirely concealed beneath a mass of pine boughs and small pine trees, arranged to represent a small clearing in the primeval forest. In this clearing was a replica of the ancient cone of the original High Rock Spring with water gushing up through it and flowing down its sides. Sir William Johnson, as characterised by one of our employees, reclined on a litter of deer skin under a nearby tree, while a chief of the Mohawk tribe offered him mineral water in a birch bark cup. In the back ground an Indian squaw was preparing a meal over an open fire. A very interesting feature of this tableau was that the characters of Indian chief and squaw were taken by Chief Whitecloud and his princess Wenonah, who are the last known lineal decendants of the chiefs of the Mohawks. The float was apparently a popular one with the spectators who lined the streets, and its significance seemed to be well understood and appreciated.

Laboratory Work.— The laboratory has continued the usual routine work incident to maintaining scientific control of the mineral water area. Partial, complete and bateriological examinations have been made of all the springs in actual use. Complete records have been kept of the fall in the mineral water levels during the active pumping period, so that the extent of depletion of the entire area might be studied. General supervision of the bath houses and the administration of the treatments has been maintained.

The season just closed was the most successful in the history of the Reservation, not only in the number of treatments given, but also in the results obtained. Never before have the waters been higher in carbonation and volume, and never before has there been such little confusion and so little difficulty in taking care of the patients. These things have been made possible by increasing the mineral water storage capacity from 32,000 gallons to 80,000 gallons, the completion of the new wing of the Lincoln Bath House, thereby adding eighty-two more tubs, and the new laundry with a capacity of 10,000 pieces per day. The new hydrotherapy department at the Lincoln Bath House was also very attractive, and greatly relieved the congestion which existed in these departments in both the Washington and Saratoga Baths.

Better Results From Treatments.—With these increased facilities and a large increase in the number of attendants employed, more time was devoted to study of individual cases, with the result that greater benefits were obtained in all sorts of cases.

The Saratoga system of baths was used with greater success than ever for various nervous afflictions, especially neuritis. The temperature graduation of the baths is the important feature. The better tonic reactions are obtained with cooler temperatures without discomfort to the patient, because the greater gas content of the baths at these temperatures maintains the body temperature, and permits the use of water even as low as 88° Fahrenheit without the least feeling of chilliness.

When the waters are heated as high as 98 to 100° there is a greater loss of gas and active properties of the waters. The results obtained in most cases with such baths are depressing and not particularly beneficial to the patient. More and more emphasis is being placed upon the importance of using proper temperatures and proper duration in treatment of all cases.

It would seem that this can only be carried out successfully through the advice of competent physicians, who must be consulted before a course of treatment is started. This along with proper diet arrangements and a definite regimen to be followed for drinking the waters, rest and exercise, are the most important needs of Saratoga today.

The idea has long prevailed that because a little mineral water is good, more is better, with the result that many drink all that it is possible to drink, regardless of the detrimental effects of such usage. Such practices must be stopped, if Saratoga is to take her place among the famous curative resorts. Some comprehensive scheme of control, such as is in vogue at European resorts, must be adopted and provided for by the State to make Saratoga the Mecca of Spas.

CONSERVATION BUREAU OF THE ATTORNEY-GENERAL'S OFFICE

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Carl Sherman	*Attorney-General*
Francis X. Disney	*Deputy Attorney-General* *In charge of Conservation Bureau*
Irving I. Goldsmith	*Deputy Attorney-General*
Edgar V. Bloodough	*Deputy Attorney-General*
Clarence R. Cummings	*Deputy Attorney-General*
Eric J. Lake	*Deputy Attorney-General*
Roy Lockwood	*Deputy Attorney-General*

CONSERVATION BUREAU OF THE ATTORNEY-GENERAL'S OFFICE

Since the last report, this Bureau has been served with summons and complaints in ten partition actions brought by George N. Ostrander, Frank L. Bell, or their wives; the object of such actions being to try the title to various tracts of land now held by the People of the State. Four of such actions arose in Essex county, five in Hamilton county and one in St. Lawrence county, and involve several thousand acres of land. In each action an examination of a former employee of the Comptroller's office, who is a principal witness for the plaintiff, was had before trial. The trial of the actions has been set at an early date before Judge Whitmyer. It is hoped that the title of the People to these vast tracts can be upheld.

In Warren county two actions were commenced by Mary J. McCarthy making the State party defendant for partition of premises in Township 24; one action involving 200 acres of valuable timber land and the other 120 acres. These cases were tried at Schenectady; but final submission has not been made.

Claims.— Further efforts have been made by this Bureau during the year 1924 to clear the calendar of the Court of Claims of the cases brought to obtain damages for lands appropriated for State Park purposes, in order to stop the running of interest on the awards.

Motions to bring in additional parties said by the Title Bureau of the Attorney-General's office to have some right or claim to the lands appropriated are noticed for argument before the court, and moving papers are being prepared in many other cases. The determination of the many questions arising on these motions will, we believe, expedite the approval of the title or hasten the disposal of these claims.

During the year 1924 the following claims were disposed of:

Claim No.	Claimant	Amount Claimed	Award
16895	John W. Olmstead..................	$7,150 00	$3,344 40
17295	John W. Olmstead..................	5.660 00	1,745 00
17038	John W. Olmstead..................	17.600 00	1.448 00
17039	John W. Olmstead..................	6,600 00	3,342 00
17303	John W. Olmstead..................	6,000 00	2,070 00
17531	Schroon River P. & P. Co............	8,400 00	1,050 00
17533	Schroon River P. & P. Co............	32,800 00	12,100 00
17060	Amsterdam City National Bank......	29,071 00	Dismissed

Ejectment Actions.— Pending in this bureau are many ejectment actions brought at the request of the Conservation Commission to settle the title of lands of the State claimed by others.

Usually the claimant is ready and willing to waive costs in order that the issue be submitted to the court. These lands remain on the State land list and the State is obliged to pay taxes on such lands until a judgment of a competent court passes upon the question of title; but investigations show that in many cases the title of the State is doubtful. Special effort has been made to investigate the facts surrounding these cases and press them to trial. Agreement with counsel for claimant as to the date of trial has been had in many cases. Some of the important cases tried are here listed:

Adirondack Power and Light Corporation: Fulton County.

Final submission not yet made before referee. (Involving lands in Glen, Bleecker & Lansing Patent.)

Cyrus Durey: Fulton County.

Three actions were commenced against Mr. Durey and tried during January and February, 1924, before Justice Borst. Two of these cases involved Mayfield Patent and the other Glen, Bleecker & Lansing Patent.

James C. Livingston, Jr.: Fulton County.

Tried March 4, 1924. This action was pending since 1907 and affects a gore of land along the southerly boundary of Hamilton County. The decision will fix the location of county lines at this point and determine the title to over $100,000 worth of forest land. Final submission has not yet been made before the referee.

Jennie H. and Joseph H. Ladew: Hamilton County.

This case, involving Osprey Islands in Raquette Lake, Township 40, Hamilton County, and commenced in 1904, reached the Court of Appeals for the third time in December, 1923, and the decision of the court was handed down in February, 1924. The Court of Appeals decided adversely to the State, holding that the State may not succeed in an action of ejectment predicated upon an invalid tax title against a person in possession claiming adversely, and under these circumstances the State's title was not strengthened by the Comptroller's notice of publication that the State had taken possession of the premises involved. The evidence offered by defendant Ladew to show that jurisdictional defects in the State's tax title having been barred from the testimony of the trial court and the record not being complete in this respect, the Court of Appeals directed that the case be returned for a new trial. Upon the forthcoming trial the State may introduce any additional or new testimony.

Katherine Isley: Oneida County.

Involving lands in Miller & Swanton lot; judgment for defendant.

Samuel J. Shipley and ano.: Hamilton County.

Involving lands in Township 15; judgment for the people.

Eugene Morse: Delaware County.

Premises located in Hardenburgh Patent, Great Lot 7; decision pending.

Isaac Burger et al.: Ulster County.

Decision pending.

Finch, Pruyn & Company, Inc., et al.: Warren County.

A motion was heard by Justice Borst in April, 1923, which was noticed by George N. Ostrander, as attorney for Finch, Pruyn & Company, for an order to vacate certain proceedings had subsequent to defendants' answers in an action commenced in 1908 and directing that deed of January 4, 1909, be declared void. This deed was made by defendants in settlement and compromise of said action. Motion was granted by Judge Borst, but on appeal by the State to the Appellate Division, the order was reversed. Motion was then made by Mr. Ostrander for leave to appeal to the Court of Appeals, which motion was granted. The Court of Appeals affirmed the order of the court below in May, 1924, and thereafter Mr. Ostrander made another motion to dismiss the complaint herein upon the merits and providing that the period of time from May 17, 1917, to the date of entry of final judgment shall not be deemed a part of the time limited by the deed of January 4, 1909, within which to cut and remove the timber on these premises. This motion was argued, together with counter motion of the Attorney-General in July, 1924, and, under date of November 3, 1924, memorandum of Justice Borst was received denying defendants' motion and granting that of the plaintiff.

Fish and Game Law Violations.— As indicating the questions involved in violations of the fish and game provisions of the Conservation Law, some of the actions pending during the year 1924 are here mentioned:

People v. Charles H. Streever et al.

This is an action brought to recover a penalty for the wrongful and unlawful taking of wild deer in the county of Saratoga. The case was tried in October, 1923, before Mr. Justice Angell and a jury, and resulted in a verdict in favor of the defendants. Subsequently a motion was made to set aside the verdict and for a new trial upon the ground of newly discovered evidence. This motion was heard by Judge Angell and an order was made granting a new trial. The case is now pending and will be ready for trial in January, 1925.

People v. Michael Schlagel.

This is an action brought to recover a penalty for the illegal possession of nets within the prescribed distance from the inland waters of the State. The case was tried before Mr. Justice Sawyer and a jury at Rochester in 1923 and at the close of the evidence a verdict was directed for the plaintiffs for the amount of the penalty. At the same time an order was granted allowing the defendant to go to the Appellate Division in the first instance upon exceptions. The case was argued in the Appellate Division at Rochester in September, 1924, and resulted in a reversal of the order of the trial court. From the order of reversal so made, an appeal has been taken to the Court of Appeals. There are four other cases now pending on appeal upon the same question as is involved in this case.

People v. Lewis Abare:

This is an action brought to recover a penalty for the wrongful and unlawful taking of deer by means of a spot light. This action was settled by defendant upon payment of the sum of $50.

People v. Ross C. Freeman:

This is an action brought to recover the penalty for the wrongful taking and possession of beaver. Issue was joined and the case settled by defendant's paying the sum of $200.

People v. Teak Hepburn:

This action was brought to recover the penalty provided by law for trespassing upon a private park and was settled by the defendant's paying a nominal sum.

People v. John Allaben:

This penalty action involves the illegal taking and possession of trout. The case is now pending.

Myron Weidman v. Edw. H. Gammon & John S. Aldrich:

This is an action brought against the defendants, game protectors, to recover the sum of $20,000, for damages claimed to have been sustained by reason of false imprisonment and malicious prosecution. Issue was joined and the case tried before Mr. Justice Smith and a jury at Lowville, in June, 1924, and at the close of the evidence the court directed a non-suit upon the merits.

Several actions against game protectors have been disposed of during the past year. Actions also have been commenced involving pollution of streams; some of which have been settled and others are now pending trial. Several actions of the nature of the cases above referred to have been tried or settled and those now pending will be moved for trial at the earliest possible time.

FINANCIAL STATEMENT

FINANCIAL STATEMENT

Summary of Receipts and Disbursements, exclusive of regular accounts, with the State Comptroller and of Division of Saratoga Springs, for Fiscal Year Ending June 30, 1924.

RECEIPTS

Hunting and trapping licenses, non-resident fishing licenses, alien licenses and spearing licenses.......	$365,766 57	
Fines and penalties	88,170 14	
Breeders' licenses	2,086 00	
Net licenses	24,216 74	
Dog licenses, sec. 193..............	4,504 00	
Tax and rentals, shellfish lands	17,047 68	
Game tags	13,574 95	
Trout tags	2,064 00	
Importation and possession	1,414 00	
Guide licenses, sec. 186............	830 00	
Sale of skins	273 90	
Sale of fish	479 70	
Interest on general accounts	217 38	
Sale of chickens	313 63	
Sale of hunting license buttons	28 54	
Expressage on hunting license accounts	32 22	
Conscience money	5 00	
Sale of carp	18 15	
Sec. 196	12 00	
Sale of eggs	100 00	
Sale of leads	16 00	
Sale of badges	90 00	
Sale of badge	25	*$521,260 85
Cuba reservoir	3,863 00	
Trespass on state lands	6,781 92	
Sale of trees	18,573 80	
Fire rebate	19,357 25	
Top lopping	15 00	
Fire fines	1,706 37	
Sale of maps	148 21	
Interest — white pine blister rust, construction highways, and suppression forest fires	118 12	
Sale of hay	444 00	
Sale of tree crates	73 00	

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* Fish and Game.

Road permits	78 25	
Sale old buildings	153 00	
Sale of rails	5 00	
Sale stone	1 00	
Phone refund	3 50	
Damage to phone line	25 00	
Survey	150 00	
Sale of badges	2 00	†51,498 42
Film rental	58 25	‡58 25
Miscellaneous	82 00	§82 00
	$572,899 52	$572,899 52

Disbursements

By checks to state treasurer	$571,330 98
By cost and collections and moieties	1,568 54
	$572,899 52

First National Bank	$365,756 53	
New York State Bank	205,574 45	
Protested checks	82 00	
Moieties	1,476 50	
Hunting license	10 04	
		$572,899 52

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† Forestry (Lands and Forests).
‡ Publicity.
§ Miscellaneous.

Disbursements During Fiscal Year Ended June 30. 1924 Exclusive of Division of Saratoga Springs

ADMINISTRATION

Personal service	$72,730 00	
Personal service, temporary	1,827 05	
Fuel, light, power and water	26 36	
Printing, general	2,847 31	
Printing laws	821 03	
Printing, departmental reports, maps and bulletins	2,933 65	
Equipment, supplies and materials	10,764 58	
Traveling expenses	10,584 41	
Communication	5,894 27	
Fixed charges	404 76	
Contingencies	35 00	
Repairs	25 75	
Motion picture films for recreational education	2,523 02	
Pollution of streams, investigations	138 30	
		$111,555 49

DIVISION OF FISH AND GAME

Game Protection

Personal services	$234,205 52	
Personal services, temporary	7,826 37	
Printing	8,413 28	
Protectors' expenses — equipment, supplies, traveling, etc	113,951 64	
Rent	6,671 25	
General expenses, equipment, supplies, bird and fish seals and tags, etc	14,705 22	
Expenses of prosecutions	2,041 77	
Expenses of boats and launches, including purchase of new boats, installation of new engine and salaries of engineers	16,708 65	
Refund of fines to Nicola DiSanza, Peter DiSanza, Nicola Jordano and Isadore Schuyler	300 00	
		$404,823 70

Fish Culture

Personal services	$23,712 50	
Personal services, hatchery laborers, regular and temporary	65,565 35	
Maintenance and operation of hatcheries	71,380 76	
Construction and equipment of field stations	2,678 51	
Replacement of pipe lines and improvement of water supply at hatcheries	7,305 59	
Oyster experimental station	654 10	
		171,296 81

Game Bird Farms

Personal services	$14,898 34
Temporary services	2,937 25
Maintenance and operation	20,811 45
Construction of storage sheds at Middle Island and Brownville game farms	997 67

Clearing woodland, Middle Island game farm	1,981 81		
		41,626 52	
Marine Bureau			
Personal services	$11,400 00		
Personal services, temporary	100 00		
Maintenance and operation	6,391 12		
Rent	5,738 50		
Erection and repairs of tripods and signals and surveying oyster lands	116 50		
		23,746 12	
			641,493 15

DIVISION OF LANDS AND FORESTS

Fire Fighting and Prevention			
Personal services	$119,324 50		
Personal services, temporary	5,000 00		
Expenses — equipment, supplies, traveling, etc	32,078 58		
Purchase of fire pumps and hose	5,756 57		
Erection and equipment of observation towers	2,920 07		
Construction of trails, shelters and camp sites	1,928 35		
Emergency — suppressing forest fires	35,000 00		
		$202,008 07	
Reforesting and surveys			
Personal services	$25,581 29		
Personal services, temporary	42,169 97		
Expenses—general printing, food, equipment, supplies, traveling, etc	45,345 58		
		113,096 84	
Printing departmental reports, maps and recreation circulars.	$4,058 27		
Refunds for undelivered trees and return of fine erroneously collected in trespass case	564 22		
Suppression of white pine blister rust disease	66,999 26		
Suppression of gipsy moth	123,227 41		
St. Lawrence reservation, repairs and improvements	1,588 48		
Repairing and construction of spillway, Cuba Lake reservation	232 70		
Cuba reservation, receipts from land sales, special fund	604 20		
Cuba reservation, sanitation, special fund	746 76		
Cuba reservation, salary of caretaker	660 00		
		198,681 30	
			513,786 21
State Parks			
State reservation, Saratoga Springs, acquisition of land	$68,998 09		
Lake George Park, acquisition of land	22,035 07		

Enfield Falls Park, acquisition of land, etc	4,803 75	
Other State parks, acquisition of land, etc	11,718 67	
		107,555 58
State Forest Preserve Fund		
Purchase of land	$1,518,635 55	
Services	24,877 69	
Expenses	10,647 62	
Disbursements by Attorney-General's office:		
Services	30,525 00	
Defense of claims	21,999 42	
Examination of titles	1,897 50	
Expenses	1,892 98	
		1,610,475 76
Total expenditures, exclusive of Saratoga Springs Division		$2,984,866 19

DIVISION OF SARATOGA SPRINGS

Income Producing Departments

Costs of Operation

Bottling Works:		
Closing out stock of supplies	$396 46	
Repairs under water lease	454 12	
		$850 58
Washington Baths:		
Supplies	$1,036 86	
Repairs	505 47	
Wages	6,213 08	
		7,755 41
Lincoln Baths:		
Supplies	$1,530 20	
Repairs	634 93	
Wages	8,068 69	
		10,233 82
Saratoga Baths:		
Fuel, light, power, etc	$5,113 58	
Supplies	1,639 36	
Wages	13,865 90	
Repairs	1,957 25	
		22,576 09
Bus operation		208 53
Laundry:		
Linen	$1,042 45	
Supplies	673 03	
Repairs	390 71	
Wages	4,273 87	
		6,380 06
Heating Plant:		
Fuel, light and power	$5,152 57	
Supplies	695 19	
Repairs	11,859 55	
Wages	8,535 99	
		26,243 30
Free service		315 62
Patterson building expense		578 53
Wages, trucking		6,199 51
Office salaries		3,160 00
General supplies		631 84
Paint shop expense		765 08
Lincoln cottage expense		50 56
Repair crew expense		4 90
Geyser house expense		19 91
Depreciated equipment		1,027 19
Gas Compressing Plant:		
Fuel, light and power	$1,728 95	
Supplies	306 71	

Repairs	2,421 77	
Wages	5,459 74	
		9,917 17
		$96,918 10

Income

Water royalties	$15,098 35	
Washington Baths	23,156 69	
Lincoln Baths	37,530 22	
Saratoga Baths	36,118 95	
Gas	16,231 73	
Rent	3,195 95	
Interest	1,981 84	
Miscellaneous	855 29	
Bus	2,058 60	
		136,227 62
		$39,309 52

Departments Not Productive of Income

Personal Service:

Parks and roads	$9,470 38	
Well department	2,690 00	
Engineering department	1,842 00	
Laboratory	2,500 00	
Superintendent's office	8,163 00	
		$24,665 38

Other Expenses:

Trucking	$6,829 35	
Parks and roads	2,615 96	
Well department	1,378 78	
Fuel, light and power	55 77	
Supplies	656 23	
Repairs	38 98	
Publicity and advertising	2,996 23	
Travel and communication	1,533 61	
Upkeep of cars	164 00	
Free service	358 23	
		16,627 14
Extraordinary expense and repairs	$281 79	
Albany office	1,527 75	
		1,809 54
		$43,102 06
Equipment		53,768 57
New structure and permanent betterment		142,516 54
		$239,387 17